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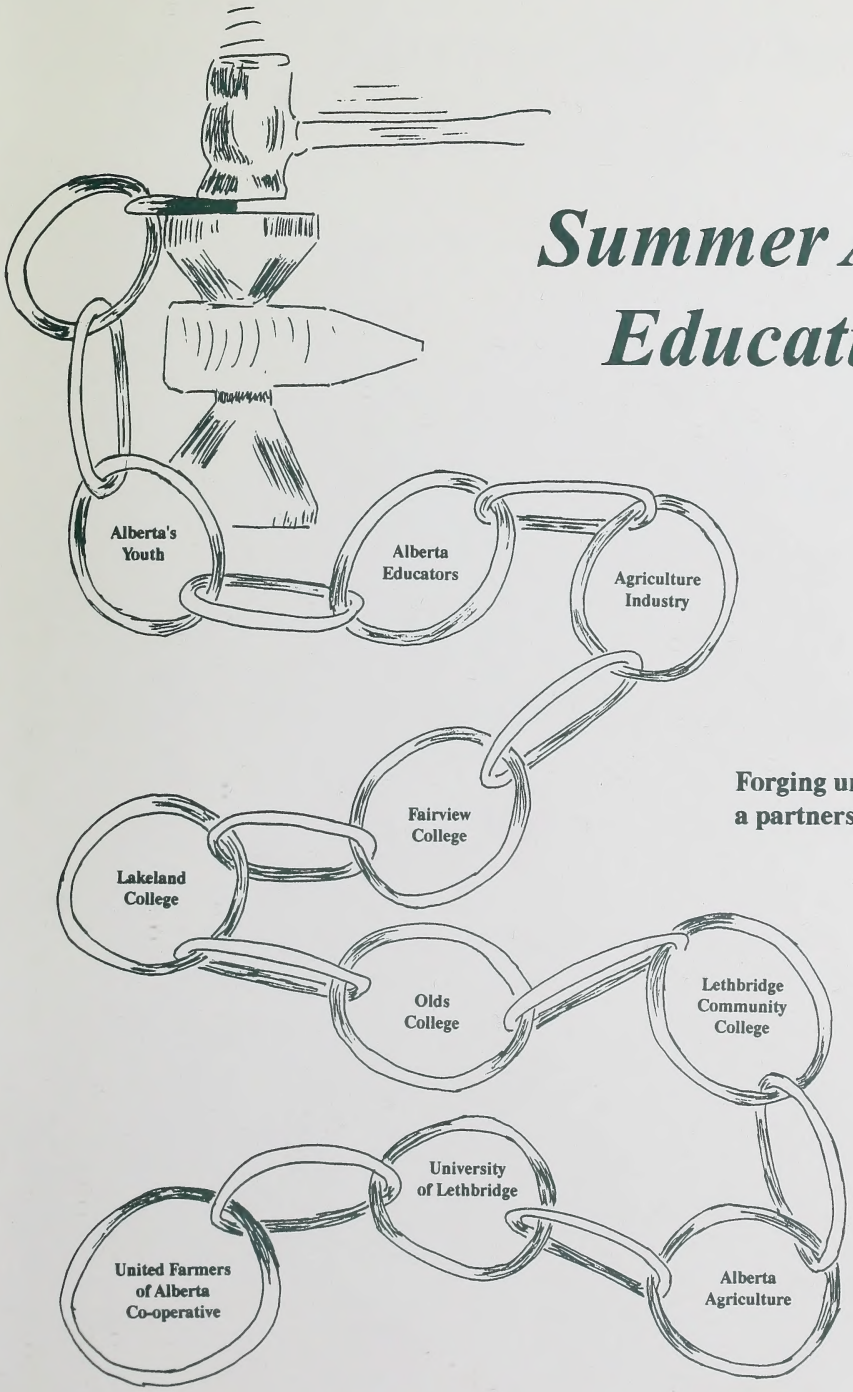

Summer Agricultural Education Institute

1990 Teacher Handbook

Forging understanding through a partnership in education.

Alberta
AGRICULTURE

FIRST EDITION
1991 - 1500 copies
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Summer Agricultural Education Institute

Resource Package 1990

A partnership with:
UFA Co-op
University of Lethbridge
Lethbridge Community College
Alberta Agriculture
and participating Alberta teachers

A Resource Book for Teachers

Divisions One through Four

(Language Arts, Social Studies, Science)

Alberta Agriculture

1991

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INTRODUCTION TO THE TEACHERS

Welcome to a whole new concept for Ag in the Classroom resources. The lessons in this book were generated by teachers at the 1990 Summer Agricultural Education Institute. This book is the first in a new series that will be produced during the four-year run of the Institute.

The lessons represented here encompass a variety of subject areas from Division One to Division Four. They are arranged according to division and grade level; hence, Grade One lessons will be at the front, while high school lessons will be at the back.

The intention of this book is to provide teachers with ready-made lesson plans which they can use to supplement their own classroom work. All the lessons have been developed to fit into the Alberta Education curriculum.

The lesson plans follow the same format as other Ag in the Classroom resources. That is, the cover page details what subject the lesson deals with, where it fits in the curriculum, and the time and materials needed to do it. The rest of the lesson provides the teacher with some background and the procedures necessary to implement the lesson. Each lesson plan also contains additional teacher and student resources, which can be photocopied. Of course, teachers are free to adapt the lessons to suit their purposes.

This book also contains a section for education units and teaching strategies. These are not in the same format as the lessons, but they may also provide useful ideas. For instance, the teaching strategies include tips on how to run a school agricultural fair and on how to carry out a debate.

Because the contributors of the lesson plans had so many different styles, a certain amount of editing was needed to get the lessons to conform to the Ag in the Classroom format. Revisions of the original lessons were done by Elizabeth Webster Goddard. Final editing and some resource writing was done by Gary Taljit.

The Summer Agricultural Education Institute was created to provide teachers with agricultural awareness and to give them the tools necessary to implement agricultural topics into the Alberta Education curriculum. The Institute provides a two-week, university-credited scholarship course that emphasizes hands-on experience. In addition to classroom work, participants tour farms and agribusinesses. They also stay on a farm for two days.

The Institute is a joint four-year venture between Alberta Agriculture's Ag in the Classroom program, the University of Lethbridge, the United Farmers of Alberta (UFA) and four agricultural colleges -- Lethbridge Community College, Olds College, Lakeland College and Fairview College.

Ag in the Classroom helps to organize and co-ordinate the Institute. It also publishes the lesson plans created by teachers at the Institute. The University of Lethbridge designs and credits the course at a master's level, and also provides the instructor. The United Farmers of Alberta provides scholarship money for up to 30 teachers each year. The UFA's four-year commitment is for $60,000. The colleges serve as hosts for the Institute, which will move to a different college each year. Each host college contributes in excess of $15,000 in goods and services. The Institute also receives support from many other members of the agriculture industry in Alberta.

We at Ag in the Classroom sincerely hope that this book will be of value to you.

CREDITS

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3. **Seasons on a Farm** 3.1
Students create a seasons book which includes an agricultural angle.

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Students read a story about Thanksgiving and create a picture on the Thanksgiving theme. They then make decorations for a school Thanksgiving celebration.

5. **People Nearby** 5.1
Children explore activities and jobs which are part of agriculture and which are supported by agriculture.

6. **A Horse is a Horse** 6.1
Students investigate the nature and habits of horses, the jobs they do and the environments in which they live. They then produce written and drawn material about horses, sharing their experiences and fantasies about this well-loved animal. Lastly they build a model showing the people who care for horses and how they provide for them.

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Students use maps, reports, Canada census, grain companies' information sources and news broadcasts to determine the nature and pattern of grain trade. Reports are in various forms, including role playing.

10. **The Great Taste Test** 10.1
Students conduct a taste test using commercial and homemade products.

11. **Milling and Muffins** 11.1
Students bake muffins using flour they have ground themselves and a second batch using purchased flour. They compare these two samples to each other as well as to purchased muffins.

12. **A Sweet Deal** 12.1
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13. **Land Use Issue -- Erosion** 13.1
Students debate the issues regarding land use decisions.

14. **Evidence of Erosion** 14.1
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17. **Greenhousing in Alberta** 17.1
Students build a small greenhouse and experiment by growing plants in a specialized environment.

18. **Accent on Agriculture** 18.1
Students use community resources to research geographic regions and to compare and contrast agriculture in different geographic areas of Canada and the United States.

19. **Agricultural Issues in the News** 19.1
Students review newspapers or magazines, choose articles and analyze and react to the articles. They suggest solutions to problems they identify within the articles.

20. **Food Chains, Webs and Pyramids** 20.1
Students research and debate the merits and drawbacks of introducing triploid grass carp into the irrigation canal systems of Alberta.

21. **This is the Job That Jack and Jill Built** 21.1
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Students solve problems within the Physics 10 and 20 curriculum using agricultural examples.

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Integration of agricultural concepts into the problem solving portion of the Junior High Mathematics curriculum for all three grade levels.

II: **Debating Procedure, Simplified** A2.1
The order of debating and guidelines to follow.

III: **Production of Food From Seeds** A3.1
Outline for a resource unit, designed for Grade 4 students to be integrated with Science, Social Studies and Health. Related activities in Language Arts, Math and Art are suggested.

IV: **Holding an Agriculture Fair** A4.1
How to plan, organize and run an agriculture fair.

LIST OF RESOURCES

ALMOST EVERYTHING STARTS ON A FARM
- Almost Everything Starts on a Farm
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THANKSGIVING
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- Hey! Hey! It's a Time to be Thankful!
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A HORSE IS A HORSE
- Horses in Alberta
- The Role of the Horse in Today's Society
- The Body of a Horse

WHAT TO EAT? WHAT TO EAT?
- Weekly Menu Plan

RIP VAN WINKLE VISITS AGRICULTURE IN ALBERTA
- The Evolution of Agriculture in Alberta
- The Development of the Tractor

CANADIAN GRAIN MAKERS -- FEEDING THE WORLD
- Canadian Grains

THE GREAT TASTE TEST
- Food Preparation Procedure: Yogurt
- Agricultural Production and Consumption Cycle
- Sample Survey Sheet

MILLING AND MUFFINS
- Basic Recipe for Muffins
- Cross-Section of a Wheat Kernel
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THE "DOMINO EFFECT" OF SOIL EROSION
- The Effects of Soil Erosion -- The Groups
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GREENHOUSING IN ALBERTA
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- Appendix 1 - Greenhouse Structure
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- Project Marking Sheet

FOOD CHAINS, WEBS AND PYRAMIDS
- Triploid Grass Carp Research in Alberta
- Pictures of the Grass Carp

THIS IS THE JOB THAT JACK AND JILL BUILT
- From Farm to Consumer: The Path of Butter

INTEGRATING AGRICULTURE INTO THE PHYSICS PROGRAM
- Problem 1 (10.3.2)
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- Problem 3 (20.2.4)
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WATER, WATER EVERYWHERE
- Overview of Irrigation in Alberta
- Map of Alberta Irrigation Districts
- Irrigated Crops - 1988
- Irrigation Districts - Incorporation & Assessed Acreages

AGRICULTURE IN THE MATH CURRICULUM
- Field Layout for Self-Propelled, Centre-Pivot System

CURRICULUM CONNECTION

LESSON TITLE	SUBJECT AREA	CURRICULUM FIT	MAJOR AGRICULTURAL CONCEPTS
1. **The Farm and Me**	Division One - Language Arts	Communicate orally; use the appropriate forms of written language for clear communication.	Exploring children's general knowledge.
	Division One - Art	Drawing; painting.	
2. **Almost Everything Starts on a Farm**	Division One - Language Arts	Read a variety of print and non-print materials; communicate orally.	Most foods originate on the farm.
	Division One - Health	Recognize and identify nutritious foods; classify foods into the four food groups.	
3. **Seasons on a Farm**	Division One - Language Arts	Communicate orally; use the appropriate forms of written language for clear communication.	How the weather affects the work that is done on farms. Seasonal activities on a local farm.
	Division One - Art	Develop themes based on environment and places; draw from observation and experience.	
4. **Thanksgiving**	Division One - Language Arts	Read material to increase understanding and infer relationships. Speak fluently on familiar subjects.	The production of food and the supply of food was vital to survival and still is.
	Division One - Art	Make decorations using collage techniques. Learn simple brush skills. Use drawing to add details.	
	Division One - Music	Sing, listen to and enjoy seasonal music.	

LESSON TITLE	SUBJECT AREA	CURRICULUM FIT	MAJOR AGRICULTURAL CONCEPTS
5. People Nearby	Division One - Social Studies	How people meet their needs in their own community The interdependence of urban-rural communities in the exchange of goods and services.	The importance of the agriculture industry to Alberta communities.
6. A Horse is a Horse	Division One - Language Arts	Listen to and read a variety of print and non-print materials. Communicate orally. Demonstrate growth in vocabulary and written language skills. Organize information from a variety of sources.	The importance of domestic animals; the farmer/rancher as caregiver; careers (veterinary).
	Division One - Science	Observe, describe and classify the characteristics of the horse as a living thing. Describe proper care of animals. Note changes in the environment that have resulted from man's activities.	
7. What to Eat? What to Eat?	Grade Four - Health	Canada's Food Guide identifies and classifies foods, selects nutritious foods.	What is produced in Alberta?
8. Rip Van Winkle Visits Agriculture in Alberta	Grade Four - Social Studies	Technology has changed the use of agriculture resources and has had an impact on lifestyle and on the environment.	Adaptation of agriculture to a changing world.

LESSON TITLE	SUBJECT AREA	CURRICULUM FIT	MAJOR AGRICULTURAL CONCEPTS
9. Canadian Grain Makers -- Feeding the World	Grade Five - Social Studies	How do Canadians use their lands and natural resources? How do the natural resources of a region affect the occupations?	Grain production, marketing and transportation.
10. The Great Taste Test	Division Three - Special Activity *(Primarily Health and Home Economics)*	Research and report information. Discern differences, find percentages, present and interpret information in graphs. Identify practical difficulties in food handling and preparation.	Food processing, marketing, consumer convenience.
11. Milling and Muffins	Division Three - Home Economics	Food handling. Processing. Marketing. Nutrition. Time management.	Production, processing and marketing systems.
	Grade Nine - Social Studies	Industrialization and technological change.	
12. A Sweet Deal	Division Three - Agriculture: Land and Life	Production, processing and marketing. Diversity of the agricultural enterprise in Alberta. Safe food consumption. Developing consumer skills.	Production, processing, marketing, management and cooperation with nature.

LESSON TITLE	SUBJECT AREA	CURRICULUM FIT	MAJOR AGRICULTURAL CONCEPTS
13. Land Use Issue -- Erosion	Grade Eight - Social Studies	People are constantly interacting with their physical environment to meet their needs. Resource development and potential consequences.	Care of the land resource; erosion.
14. Evidence of Erosion	Grade Seven - Science	Infer processes that have led to major erosional features. Recognize, describe and identify the process of weathering. Recognize evidence of erosion.	Erosion/conservation of soil.
15. The "Domino Effect" of Soil Erosion	Grade Eight - Social Studies	The influence of physical environment on people's way of life.	Soil conservation.
16. Putting Your Best Foot (Hoof?) Forward!	Division Three - Language Arts	Visual communications possess distinctive elements and structures which may affect meaning. The viewer must evaluate the apparent reality created in media products. Competence and flexibility in writing are developed through a broad range of writing experiences for a variety of purposes and audiences.	Promotion of the industry.
17. Greenhousing in Alberta	Grade Seven - Science	Topic 1: Characteristics of Living Things - identify and describe characteristics of living things: in particular their ability to grow and reproduce (i.e., photosynthesis and plant propagation).	Plant propagation; monitoring plant growth; controlling plant growth environments; specialized technologies for plant production.

LESSON TITLE	SUBJECT AREA	CURRICULUM FIT	MAJOR AGRICULTURAL CONCEPTS
17. Greenhousing in Alberta (cont'd)	Grade Eight - Science	Topic 5: Growing Plants.	
	Grade Eight - Agriculture	Theme 2: Technology and Research - artificial environments, optimum conditions for plant growth.	
18. Accent on Agriculture	Grade Eight - Social Studies	Topic A: Geography of Canada and the United States. The interaction of people with their physical environment influences patterns of life.	The impact of agriculture on daily lives, flexibility of the industry and its people, the interdependency of agriculture and geography.
19. Agricultural Issues in the News	Grade Nine - Science	Topic 6: Environmental Quality. Human actions modify environments through direct changes to living things, water, air and land; also through indirect effects.	What forces in society and nature affect agriculture? Identifying issues and making informed decisions.
	Grade Nine - Language Arts	Evaluate the reality created in media products.	
20. Food Chains, Webs and Pyramids	Division Four - Science 14	Investigating the Environment - the influence of science and technology; interaction of organisms within an ecosystem (food chains, webs and pyramids).	Resource management, problem-solving.
	Division Four - Biology 20	Mankind's activities may affect the ecosystem.	

LESSON TITLE	SUBJECT AREA	CURRICULUM FIT	MAJOR AGRICULTURAL CONCEPTS
21. This is the Job That Jack and Jill Built	Division Four - C.A.L.M. 20	Identify alternatives. Research educational requirements. Relate knowledge of personal lifestyle to occupations. Relate personal skills, aptitudes and knowledge to occupational requirements, decision-making.	Agriculture as a major generator of employment.
22. Integrating Agriculture into the Physics Program	Division Four - Physics 10	Motion and related principles as outlined in concepts 10.3 - 10.6 of Alberta Education curriculum guide (1977).	Problem solving, design.
	Division Four - Physics 20	Momentum and the interaction of bodies in nature, energy, simple machines, physics and personal safety as outlined in concepts 20.1 to 20.2 and 20.6 to 20.7 of curriculum.	
23. Water, Water Everywhere	Grade Seven - Agriculture	Agricultural water use and management.	Water management and technology.

Activity 1

THE FARM AND ME

STUDY QUESTION: What is the children's knowledge level about farms?

THE ACTIVITY: Children share information orally and then produce a personal story and picture about themselves and a farm.

CURRICULUM FIT:

DIVISION ONE - LANGUAGE ARTS
- Communicate orally; use the appropriate forms of written language for clear communication.

DIVISION ONE - ART
- Drawing; painting.

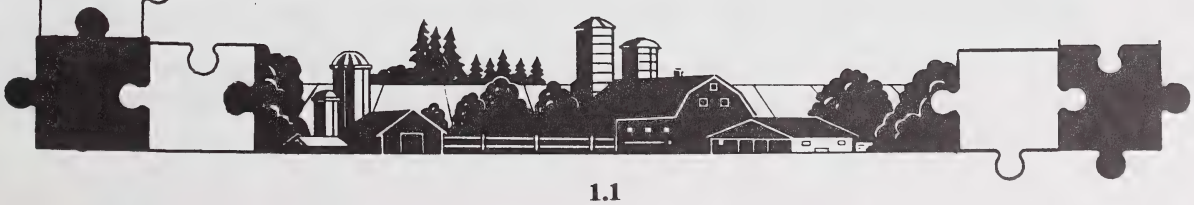
AGRICULTURE CONCEPTS: Exploring children's general knowledge.

PURPOSE: To find out the baseline of class knowledge before attempting any other agricultural theme activities.

To share the knowledge that is in the group and build interest, as well as recall (hopefully) pleasant memories.

MATERIALS REQUIRED: Paper, pictures of rural scenes cut out and used as a display (optional, but stimulating).

TIME REQUIRED: One to two class periods.



BACKGROUND - For the Teacher

This activity allows you to quickly assess the class's knowledge level regarding agriculture. It is also an activity which the children will enjoy as they share their experiences. It should build interest for future activities on the theme and provide some bridges into those activities.

PROCEDURE

Part 1 Introduction	1.	Introduce the theme with a question or two, such as, "How many of you live on a farm?" or "Have you ever visited a farm?" or "What can you tell me about a farm?". To prompt discussion, or to aid recall, or to reinforce what is said, the class can examine a display of pictures of rural scenes at this time.
Part 2 Activity	2.	The students will write a story beginning, "A farm is ...". Give spelling help on an individual basis.
	3.	Those who finish their story will draw or paint a picture on the same theme.
Part 3 Conclusion	4.	The students make a display of their finished work (replacing the introduction photos if necessary). These stories can be used as a knowledge pre-test for the individual students.

DISCUSSION QUESTIONS

1. If you lived on a farm, how would your life be different? (Possible responses: I might have farm chores; I might have interesting pets; I would have to take a school bus a long way to school; I would have to learn to drive a tractor someday.)
2. If you visited a farm, what would you expect to see?
3. What kind of machines do you see on a farm? What kind of animals?

EVALUATION STRATEGIES

1. Repeat this activity at the end of agricultural theme activities and compare with the first one to evaluate knowledge change.

RELATED ACTIVITIES

1. Introduce poems and stories which have a farm theme. Point out to the children that sometimes poems and stories talk about the farming of long ago and not the farming of today.
2. Students could make a small model farm, using paper cutouts, popsicle sticks or other miscellaneous items.

Original lesson idea by Lillian Machacek
Modifications by AITC

Activity 2

ALMOST EVERYTHING STARTS ON A FARM

STUDY QUESTION:

Where does our food come from? What should we be eating for health?

THE ACTIVITY:

Students will share their knowledge about foods which are grown in the area. They will classify them according to Canada's Food Guide by making a collage.

CURRICULUM FIT:

DIVISION ONE - LANGUAGE ARTS

- Read a variety of print and non-print materials; communicate orally.

DIVISION ONE - HEALTH

- Recognize and identify nutritious foods; classify foods into the four food groups.

AGRICULTURE CONCEPTS:

Most foods originate on the farm.

PURPOSE:

To share student knowledge and experience of farms and food production.

To give children an opportunity to develop further their language skills while they learn about the importance of food and nutrition.

MATERIALS REQUIRED:

Old magazines, scissors, glue, chart paper, area to display the food collages.

TIME REQUIRED:

One to two class periods.

BACKGROUND - For the Teacher

Use this activity to assess the knowledge level of the students regarding agriculture and basic food health guidelines. Food is a familiar and friendly topic. This would be a very comfortable group activity at the start of the year when students are just getting to know each other or getting reacquainted.

PROCEDURE

Part 1 Introduction	1.	Introduce the theme with one or two questions, such as: "If you drive through the countryside of Alberta, you will see farms everywhere. What do you think is growing on those farms? What things do we eat everyday that is grown or produced nearby?" It might help the children to remember what they have eaten in the last few days. Record the correct responses. You could use a favourite food, such as pizza, and ask the children what the ingredients are. Then, discuss whether those ingredients, such as cheese and onion, might have come from Alberta. You could choose a traditional meal for a particular event, such as Christmas, New Years or a birthday, and query about the origin of the elements of the meal.
Part 2 Activity	2.	Recall Canada's Food Guide (introduced in Grade One, available through Alberta Agriculture Publications - Homedex #1112-10-7). Break the class into small groups and distribute the supplies. Instruct the students to make a collage of the foods which go into the Guide. (You could assign one food group per small group to simplify things).
	3.	Complete a fifth group of "combination foods" and a sixth for "extras" like cakes, pies, etc., if desired.
Part 3 Conclusion	4.	Display the completed collage.

EVALUATION STRATEGIES

1. The students can be evaluated on their participation and cooperation.

RELATED ACTIVITIES

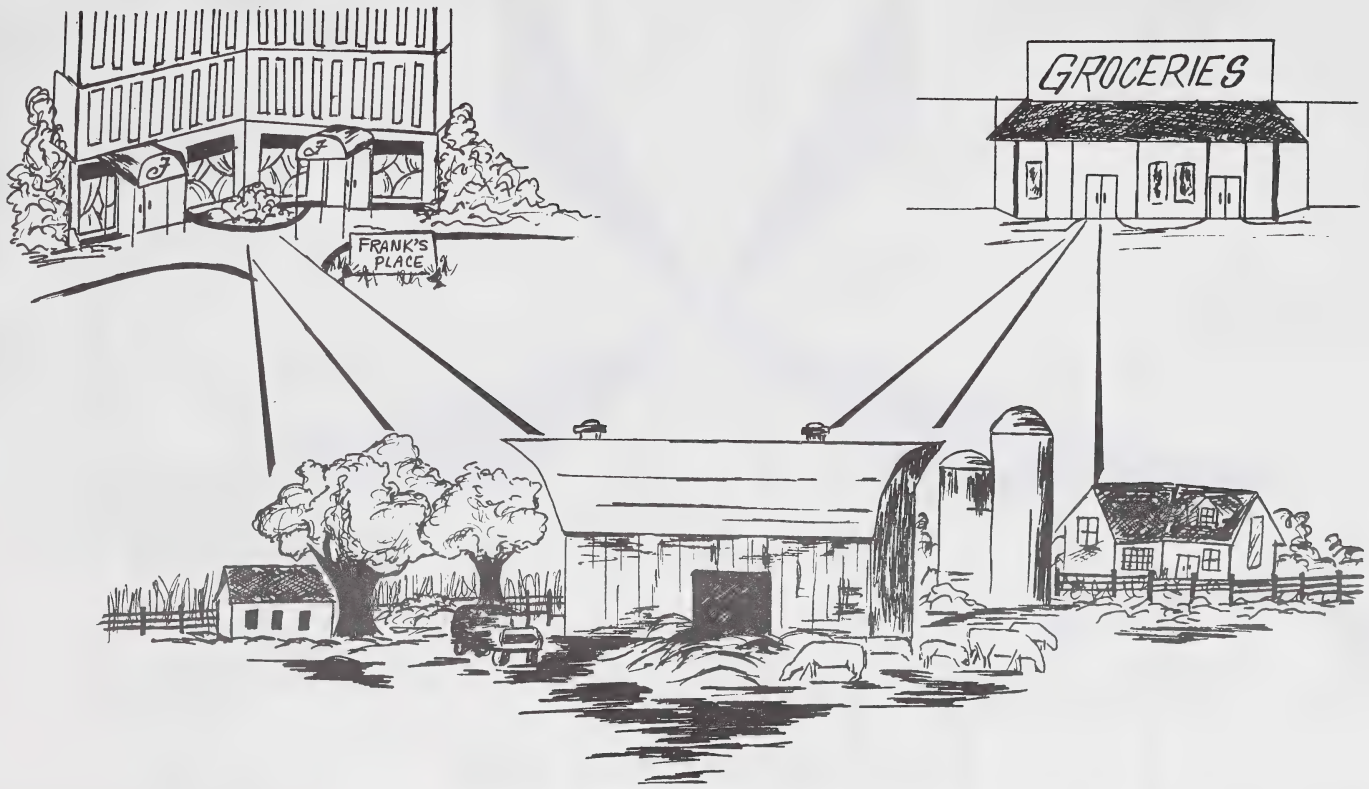
1. To reinforce ideas, the teacher might display his/her lunch which (surprise!) features foods which are grown or produced in Alberta.
2. The teacher could ask students in the next few days what foods they have eaten lately that might have been produced or grown on a farm. Ask them what food group that food would fit into.
3. Cut manilla sheets into four. Each child will produce a personal set of Food Guide cards, according to what he or she has eaten in the past week. Print the name of the food group on the cards, if necessary.

Original lesson idea by Lillian Machacek
Modifications by AITC

STUDENT RESOURCE

SHEET ONE --

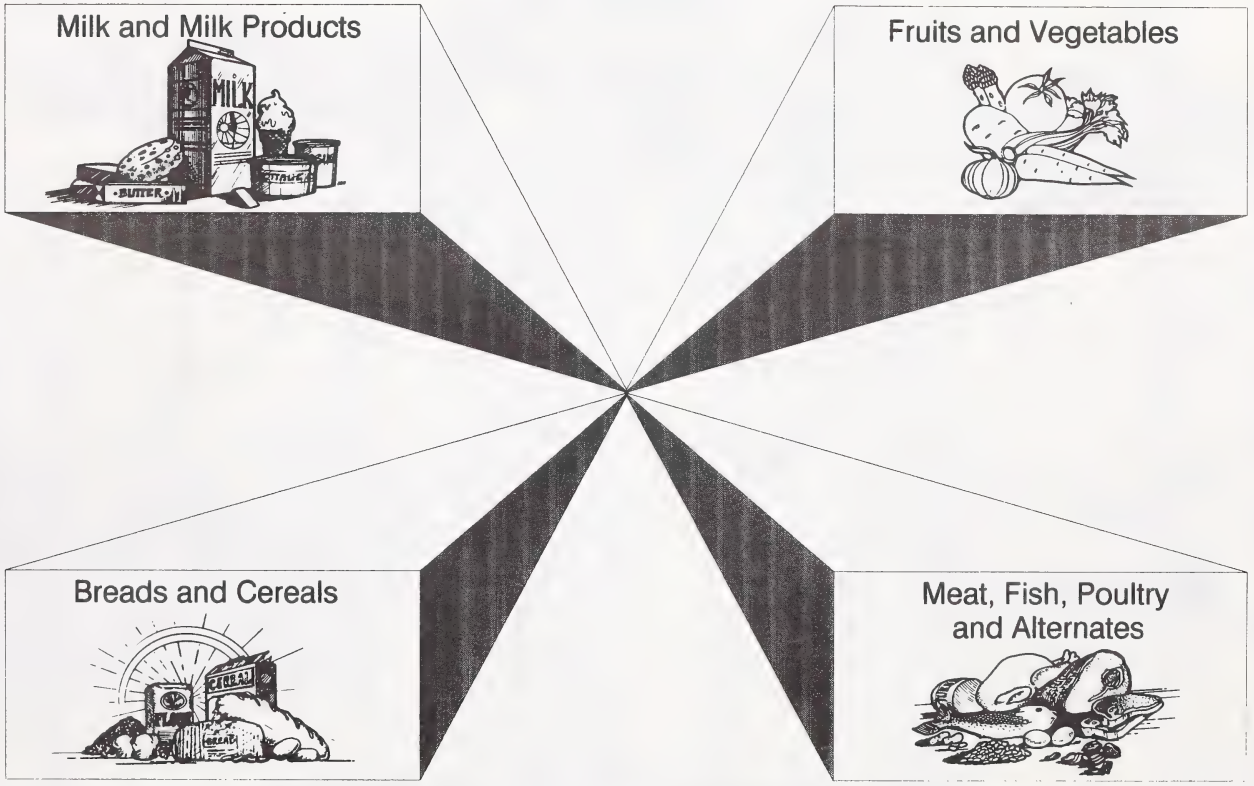
Almost Everything Starts on a Farm



STUDENT RESOURCE

SHEET TWO --

Four Basic Food Groups



Activity 3

SEASONS ON A FARM

STUDY QUESTION: What are the seasons? How do they affect me? How do they affect the farms in Alberta?

THE ACTIVITY: Students will create a seasons book which includes an agricultural angle.

CURRICULUM FIT:

DIVISION ONE - LANGUAGE ARTS
- Communicate orally; use the appropriate forms of written language for clear communication.

DIVISION ONE - ART
- Develop themes based on environment and places; draw from observation and experience.

AGRICULTURE CONCEPTS: How the weather affects the work that is done on farms.

Seasonal activities on a local farm.

PURPOSE: To recognize the diversity of seasonal activities.

MATERIALS REQUIRED: Papers, crayons, old magazines

TIME REQUIRED: Two class periods.

BACKGROUND - For the Teacher

The change of seasons is something experienced by all the students in the class. This activity encourages the students to be aware of seasonal activities around them. It encourages them to develop their ability to observe and describe natural processes. It is also an opportunity for them to work comfortably together.

PROCEDURE

Part 1 Introduction	1.	Locate pictures of seasons from your files. (Children can bring pictures from home, if possible. Old magazines may be a good source of pictures.)
Part 2 Activity	2.	Brainstorm for ideas of what the differences between the seasons might mean for: (a) the students themselves; and (b) farmers nearby. List the ideas under appropriate headings on the board.
	3.	Using the pictures and the brainstorming session as inspiration, have the students create seasonal pictures on a theme that interests them. (It would be nice if it was strictly an agricultural theme, but there is no hard and fast rule.) Then, have the students write paragraphs describing the meaning of what they've drawn. The "books" can be organized by the four seasons or by the topics of seasonal fun (recreation), seasonal clothes, seasonal jobs and seasonal foods (topics are suggestions only).
Part 3 Conclusion	4.	Display the books.

DISCUSSION QUESTIONS

1. What signs of this season can be seen from the classroom window? What things do you like about this season?
2. What are the farmers in the area busy doing these days? Ask about different types of operations (e.g., dairy, beef, grain, poultry) to point out that farm work varies considerably.
3. What season do you think farmers might like best? Why?

EVALUATION STRATEGIES

1. Check seasons books and add comments. See how well individuals express ideas in writing and drawing.
2. Have the children make oral presentations of their work.

RELATED ACTIVITIES

1. Children visit a grain elevator and bring back seeds to make a seed picture.
2. Teacher provides seeds and students make a seed picture.
3. Reading of poems or stories about the seasons on the farm. (Farm Women News and Country Guide would be helpful references.)
4. Children interview parents about agricultural activities according to seasons. Children bring in food labels of Alberta Products.

Original lesson idea by Lillian Machacek
Modifications by AITC

Activity 4

THANKSGIVING

STUDY QUESTION:

What is Thanksgiving? What are we giving thanks for today? How did Canadian Thanksgiving start?

THE ACTIVITY:

Students will read a story about Thanksgiving and create a picture on the Thanksgiving theme. Students will make decorations for a school Thanksgiving celebration.

CURRICULUM FIT:

DIVISION ONE - LANGUAGE ARTS

- Read material to increase understanding and infer relationships.
- Speak fluently on familiar subjects.

DIVISION ONE - ART

- Make decorations using collage techniques.
- Learn simple brush skills.
- Use drawing to add details.

DIVISION ONE - MUSIC

- Sing, listen to and enjoy seasonal music.

AGRICULTURE CONCEPTS:

The production of food and the supply of food was vital to survival and still is.

PURPOSE:

To give thanks for our harvest and other aspects of Canadian life.

To recognize the importance of food production.

To celebrate the passing of seasons.

MATERIALS REQUIRED:

Scissors, glue, poster paper, old magazines, old seed catalogues, stencilled pictures of traditional Thanksgiving images, "The Origins of Canadian Thanksgiving Day" (attached), pictures or samples of foods for which you are thankful (e.g., pumpkin, bread, apples).

TIME REQUIRED:

Two class periods.

BACKGROUND - For the Teacher

We often think of the first Thanksgiving as an American event. However, the first recorded Canadian Thanksgiving held by Martin Frobisher actually precedes the American one by over 40 years! The main message behind these earlier Thanksgiving ceremonies is that people knew very well where their food came from and did not take it for granted. Thanksgiving was an event to formally recognize their appreciation for a harvest and for surviving another season in a hostile land. The act of giving thanks at harvest time extends to most cultures historically and to the present day. This activity capitalizes on a well-known event and ties it to the food production theme.

PROCEDURE

Part 1
Introduction

1. Introduce the theme with questions, such as:
   (a) A special holiday is coming up soon -- what is it?
   (b) What does Thanksgiving mean?
   (c) There are many things which we are thankful for and are happy about. For example, "I am happy that I have friends. I am thankful that I have you in my class." Encourage the children to name things for which they are thankful. (Note on board?)
   (d) Thanksgiving is a special time when many of us give thanks for people and things which we are glad we have and enjoy. How do we celebrate Thanksgiving?
   (e) No doubt food will be mentioned and that will be the time to introduce how and why the first Thanksgiving started. (Refer to "The Origins of Canadian Thanksgiving Day".) Ask the children to name foods for which they are thankful. Display the food items which you brought, as reinforcement for their ideas.

Part 2
Discussion

2. Ask them who produces or grows the food for which they are thankful. Perhaps they will list the farmer as one for which they are also thankful (we can always hope!).
3. Students read the fictional Thanksgiving story (attached) or the teacher reads it to them. Discuss and review. Compare that Thanksgiving to their Thanksgiving.

Part 3
Activity

4. Using supplies, students create either an individual or a group collage of things for which they are thankful. This can be displayed and used as part of the Thanksgiving decorations.
5. Students choose and prepare (cut, colour, display) Thanksgiving symbols to decorate the classroom.

Part 4
Conclusion

6. Students may wish to add to these efforts as the week progresses and as they think of more things for which they are thankful. If students make personal pictures, they could possibly add a photograph or drawing of their families, and this could be sent home for use as decoration at their Thanksgiving.
7. Children can sing the Thanksgiving song, "Hey! Hey! It's a Time to be Thankful!" (attached), or another one which you prefer.

DISCUSSION QUESTIONS

1. Why do we often eat turkey at Thanksgiving time? (Turkey is a traditional festive bird and has been used for celebration for centuries in North America, possibly because it is bigger than a chicken and has a unique flavour. Wild turkeys still thrive in Eastern Ontario. They are a protected species.) How much do domesticated turkeys weigh? (up to 50 pounds [about 23 kilograms] is not unheard of!!!)
2. Farmers celebrate Thanksgiving too. What do farmers give thanks for?
3. Why do we celebrate Thanksgiving in the fall? What season follows Thanksgiving? (When we celebrate Thanksgiving we are looking into the start of winter. Thanksgiving is a way of saying we are prepared. Today, the farmer does most of the preparing for us, since most of us do not produce our own food.)
4. How does Thanksgiving make you feel?

EVALUATION STRATEGIES

1. Participation, communication skills checklist (listens when others speak, responds appropriately to questions, shares ideas, etc.).

RELATED ACTIVITIES

1. Students make a picture using food materials, such as pasta, grain seeds, dried peas and beans, indicating some of the foods for which they are thankful.
2. Students act out a simple play of what the first Thanksgiving might have been like in Canada.
3. Students write a simple poem of things for which they are thankful.
4. Read and discuss seasonal poetry. Choral reading of poetry is a possibility here.

Lesson plan inspired by Lillian Machacek
Additions and modifications by AITC

TEACHER RESOURCE

SHEET ONE --
The Origins of Canadian Thanksgiving Day

The Canadian Thanksgiving Day is a combination of two celebrations that Canada has borrowed from traditional harvest celebrations in European societies: the formal thanksgiving observations held by Martin Frobisher in the Eastern Arctic in 1578; and the American Thanksgiving held later in 1621 in Massachusetts, to produce what we know today as Thanksgiving.

In 1763 Halifax proclaimed a day of Thanksgiving to commemorate the end of the Seven Years' War. The observation of Thanksgiving moved across the country with the settlers and was gradually adopted throughout.

The tradition of the menu which includes turkey, squash and pumpkin originates with the American event and continues today. The specific menu preferences may have moved across the border with Loyalists.

The date for Thanksgiving has changed several times. The observance of the second Monday in October was proclaimed in 1957. Thanksgiving was established as a national, rather than a religious, holiday. It is ironic that this date falls within the busiest time of the year for many farmers, so that they are often in the field and unable to observe it.

SOURCES

Mills, David. "Thanksgiving Day" in The Canadian Encyclopedia, v. 3, p. 1805, Edmonton: Hurtig, 1985.

Foster, Annie H. and Grierson, Anne. High Days and Holidays in Canada. Toronto: Ryerson Press, 1956.

STUDENT RESOURCE

SHEET ONE --
Hey! Hey! It's a Time to be Thankful!

(sung to the tune of "Boom Boom Ain't it Great to be Crazy?")

Chorus

Hey! Hey! It's a time to be thankful!
Hey! Hey! It's a time to be thankful!

Family and flowers, food and fun,
Hey! Hey! It's a time to be thankful!

xxxxx

Verse

I look around and I'm so happy,
Lots of things that I'm glad to see.
I live in Canada and I'm free!
And there's farmers out there growing
food for me!

xxxxx

Chorus

STUDENT RESOURCE

SHEET TWO --

A Thanksgiving Story (fiction)

(set in the late 1700s in rural Canada)

"Wait up!" Robert called to his sister Sarah. He carried a heavy pail of water to the back step. "Help me lift this pail over the step!".

Robert was younger than Sarah. He had just started carrying water for his mother as one of his chores.

Sarah put down her load of wood and helped her brother. "There, you're almost done! I have filled the wood box for Momma and now we can play with the baby." Sarah and Robert stepped into the house. It was warm and smelled good.

Grandma stood by the fireplace, stirring something in the big pot which hung over the fire. "Hello, children! Come here and warm your hands!"

Robert and Sarah ran to Grandma and gave her a hug. "What are you making, Grandma?" Robert asked.

"Rabbit soup for our supper. It will taste good on a cold day. I also put in carrots, onions and turnips from our garden," said Grandma.

Robert and Sarah leaned over to look into the pot. "Is that the rabbit that Poppa caught in the woods?" Sarah asked.

"The very one!" Grandma said. "Your Poppa is a good hunter."

Robert and Sarah smiled. They were proud of their father.

Momma came from behind the blanket which was the door to the bedroom. "The baby is sleeping now. You can help us prepare for tomorrow's special meal. We will have guests!"

Sarah and Robert jumped up and down. "Who is coming? Why are we having a special meal?"

Mother brought some bread out of the box where she kept it. She laid it on the wooden table. "Aunt Jessie and Uncle William are coming in their wagon with their children. They will sleep here tomorrow night. Cousins Rupert and Beatrice from the next farm will also come. And Aunt Beatrice is making berry pies! We are having a special meal to give thanks for all that we have been given. We call it 'Thanksgiving'. We have a lot to be thankful for. Please wash your hands and then help me break up this bread, Robert. Sarah, please chop this onion. Be careful with the knife!"

"Why am I breaking up the bread, Momma? Is there something wrong with it?" Robert asked.

"No dear. There's nothing wrong with the bread. We are going to put it with the onions into the turkey! Then we will cook it for our special meal," Momma replied. "It will smell and taste good."

Sarah and Robert knew about the turkey. Poppa had shot it in the woods behind the big field. Robert had saved some of the feathers to play with.

STUDENT RESOURCE

SHEET TWO (cont'd) --

"Well, I'm thankful that we have a warm house to live in." Grandma said. She was still stirring the soup in the pot. "Our first winter in Canada was so cold and lonely."

"Yes, Mother, and I'm glad we have had a good harvest this year. We will have lots to eat this winter!" Momma said.

Sarah asked "Will we be thankful for the trees since they make the wood we burn?"

"Yes, Sarah, we're thankful for the trees. Trees are important to us." Momma answered.

"I'm finished with the bread." Robert called out. "And I'm thankful there isn't any more I have to break up right now!" Everyone laughed.

"Well, Robert, you have finished your chores. Come sit by me and we will sing a song together while Momma and Sarah work." Grandma called. Robert snuggled into her lap. He was a happy boy. He could hardly wait for Thanksgiving.

Activity 5

PEOPLE NEARBY

STUDY QUESTION:

How important is agriculture to our community? How important is our community to agriculture?

THE ACTIVITY:

Children explore activities and jobs which are part of agriculture and which are supported by agriculture.

CURRICULUM FIT:

DIVISION ONE - SOCIAL STUDIES

- How people meet their needs in their own community.
- The interdependence of urban-rural communities in the exchange of goods and services.

AGRICULTURE CONCEPTS:

The importance of the agriculture industry to Alberta communities.

PURPOSE:

To experience cooperation in the way the community is interrelated.

To recognize the importance of agriculture in our lives.

MATERIALS REQUIRED:

A piece of cardboard approximately 24 cm by 30 cm with 1.5 m pieces of string or coloured wool stapled around the perimeter (one string for each participant, including the teacher and aides). The word "agriculture" is printed prominently on the cardboard.

Physical Arrangement

An open space large enough for the group to sit on the floor in a circle. (If a very large group, the pieces of string may have to be longer.)

TIME REQUIRED:

One class period.

BACKGROUND - For the Teacher

This activity helps participants start to answer the question, "Where do I fit in?". This is a thought-provoking exercise that involves all students and validates their role in the community. It builds self- esteem and respect for others.

PROCEDURE

Part 1
Introduction

1. Put the piece of cardboard on the floor with the strings radiating out. The group sits around the cardboard.
2. Talk about people's jobs. Brainstorm - list occupations where they can be seen by the group.

Part 2
Activity

3. Draw attention to the piece of cardboard. What does the word "agriculture" mean to us? When someone mentions farming, the people who live on farms move in more closely and take up a piece of string.
4. Talk about all the services directly related to agriculture, e.g., veterinarians, mechanics, electricians, bankers, insurance agents, elevator workers. Children whose families are engaged in these jobs join the circle, each holding a string.
5. Talk about the businesses selling goods to the farmers, e.g., machinery dealers, fuel agents, car and truck dealerships, lumber yards, hardware stores, grocery stores, clothing stores. Children whose families are engaged in these businesses join the circle.
6. What are other people services that serve farming communities? e.g., postal workers, firefighters, teachers, doctors, dentists, school janitors. Children whose families are engaged in these occupations join the circle.
7. What is another important group that the farmers need? The people that buy the food they produce! Any remaining children join the circle and take up a string.

NOTE
If everyone very gently lifts on his/her string, the group will be able to lift the piece of cardboard. This is a way of further emphasizing that agriculture supports the community and the community supports agriculture.

****A WORD OF CAUTION****
In the case of unemployed or welfare families, be very sensitive about the occupation part of the activity. Adapt the activity to be sure that everyone is involved.

8. "We are all Connected" -- Illustrate with two-ended arrows on the blackboard how all the students are connected. (Use the example below as a model.) Emphasize that just as the community needs the farmers, so the farmers need the community.

GOODS		FARM FAMILIES		SERVICES
Darci (grocery store)	⟷	Neil	⟷	Jody (nurse)
Kalie (lumber yard)	⟷	Dana	⟷	Terri (banker)
Scott (hardware)	⟷	Ryan	⟷	Sandra (electrician)
Carissa (machinery)	⟷	Simone	⟷	Brendan (teacher)

Alternate Activity 1. Carry out in the same way except the children state what they would like to be when they grow up and then use those occupations.

DISCUSSION QUESTIONS

1. What would happen to agriculture and farmers if half of these services were not available? (You can name specific services and those children can drop their strings.)
2. What would happen to agriculture if people stopped buying enough of their products?
3. What would happen to these businesses if farmers stopped using their services?
4. What would happen to our community if farmers just moved away? (People representing farm families and the people that would be affected drop their strings.)

EVALUATION STRATEGIES

1. A checklist of discussion and interaction skills:
   - a) understands and follows rules
   - b) waits for turn to speak
   - c) does not monopolize the time but takes an active role
   - d) listens to other's point of view
   - e) acts with courtesy to other students
   - f) offers alternate suggestions
   - g) keeps on subject
   - h) cooperates in group situation

RELATED ACTIVITIES

1. Write and illustrate a story about my family's occupations.
2. Bulletin board display showing the interdependencies of agriculture and the services in the community.
3. Mathematics - bar graph showing distribution of occupations within the classroom.

Original lesson idea by Maxine Pugh
Modifications by AITC

Activity 6

A HORSE IS A HORSE

STUDY QUESTION:

What roles do horses play in our lives? How have humans changed the environments that horses live in? What are the characteristics of horses?

THE ACTIVITY:

Students investigate the nature and habits of horses, the jobs they do and the environments in which they live. Students produce written and drawn material about horses, sharing their experiences and fantasies about this well-loved animal. Students build a model showing the people who care for horses and how they provide for them.

CURRICULUM FIT:

DIVISION ONE - LANGUAGE ARTS

- Listen to and read a variety of print and non-print materials.
- Communicate orally.
- Demonstrate growth in vocabulary and written language skills.
- Organize information from a variety of sources.

DIVISION ONE - SCIENCE

- Observe, describe and classify the characteristics of the horse as a living thing.
- Describe proper care of animals.
- Note changes in the environment that have resulted from man's activities.

AGRICULTURE CONCEPTS:

The importance of domestic animals; the farmer/rancher as caregiver; careers (i.e., veterinary).

PURPOSE:

To develop students' appreciation of the role the horse played in the settlement of Alberta and its continued contribution to Alberta.

To help students develop a respect for the proper handling of animals by showing them some of the care and training horses require.

MATERIALS REQUIRED:

Stories, poems, pictures of horses, flipchart, the students' imaginations, print and video material from various sources (see resource list at the end of the lesson plan).

TIME REQUIRED:

Varies from one to five class periods, depending on interest of class.

BACKGROUND - For the Teacher

Most children are fond of horses. There is something magnificent and appealing about the animal, despite the great size difference between a child and a horse. In Alberta, horses were an important part of the Plains Indian culture from the mid-1700s to the late 1800s. Horses have also played an important role in establishing European settlement in Alberta and, although they are rarely used as a power source anymore, horses are big business in the province. Racetracks, recreational riders and slaughterhouses are among those that use this versatile animal. Students will learn about the different types of horses and about the variety of duties within the horse industry. Capitalize on your students' natural interest to reach objectives in the classroom.

HINT
This lesson would be very good as an independent study option.

PROCEDURE

Part 1
Introduction

1. We have all heard of famous people. Who can name some famous horses? What are these horses famous for? Note on chalk board or flip chart. We could say that these horses were doing their jobs. What other jobs for horses can you think of? Add to list.

Part 2
Activity

2. Back in history, horses had other jobs because life was different then. If you were a horse 100 years ago, what job might you have had? Teacher might like to add to this list. Language Arts opportunity -- students write a letter or story or poem about a horse at work 100 years ago and a horse at work today. Some of these could be read aloud at a later point. Teacher might also assign a story which features a horse.
3. "Horses were first brought to North America by the Spanish. Some horses escaped and lived wild. There are still bands of wild horses across North America today. What would their lives be like? Let's make up a poem or a song about wild horses and how they have to live!" (Themes of finding food and shelter, man's encroachment into their wild territory, fear of being caught, how they have to fight off other wild animals and protect their young.)
4. Most horses are domesticated today. Where do we see horses today? What kind of care do they need to keep healthy? Brainstorm what horses need. Children can draw a poster or make a collage which shows what horses need to keep healthy and who provides for them. Some of the children may have helped care for a horse and may be potential resources.

   Students may create and label a model of what a "horse environment" would look like, including proper shelter, water, fencing, exercise area, storage for equipment and food and also all the people who come into contact with a horse (e.g., owner, trainer, vet, perhaps members of the family).

   What do you call a doctor for horses and other animals? How does a person get to be a veterinarian?

TEACHER'S NOTE
Over half of first year veterinary science students at the University of Guelph are female.

5. Why aren't there more wild horses around? What has changed?

Part 3
Conclusion

6. One of the new "jobs" for horses is starring in movies!! What movies can you name that had horses in them? How do horses know what to do and when in a movie? Introduce the idea of horse trainers and handlers to the students. How does a person learn to be a good trainer or handler?

DISCUSSION QUESTIONS

1. How many of your families have a horse? If we lived 100 years ago, how many people's families would have horses? Why this difference?
2. If you had to take a horse a long way, you would move it in a special piece of equipment called a horse trailer. How would you make sure the horse was safe and comfortable when travelling?
3. Some horses become frightened easily. If we were to walk into an area where horses were being kept, what could we do so that we did not frighten them? What should we do to keep ourselves safe?

RELATED ACTIVITIES

1. Write a research report (individually or in small groups) on four different breeds of horses including their differing characteristics and their uses to mankind.
2. Investigate the nutritional needs of horses and how to meet them. Is it important that horses eat a particular diet?
3. Invite a guest speaker into the class and interview that person about his/her work with horses (e.g., farmer/rancher, trainer, handler, photographer of show horses).
4. During a field trip to an event or location where horses will be present assign students to make observations about the horses, their behaviours and the people who work with them.
5. Tour a farm/ranch or other site where horses are kept. Refer to the "Tour Tips" pamphlet produced by Agriculture in the Classroom for safety suggestions.

RESOURCES

"Horses in Alberta" (attached)

"Tour Tips". Agriculture in the Classroom publication. To obtain, telephone 427-2402 or write to Ag in the Classroom, Room 200, 7000 - 113 Street, Edmonton, Alberta T6H 5T6.

Alberta Agriculture Publications List and Audio Visual Catalogue (these may be in your school resource area. Or, they are available from Print Media Branch or Film Library at 7000 - 113 Street, Edmonton, Alberta T6H 5T6). For this lesson the publications "Horse Management - Feeding" (Agdex 460/50-1) and "Horse Handling Facilities" (Agdex 460/722-1) might be useful.

The films "Equitana" and "Equitana 85" which depict the beauty and versatility of horses in Alberta might be good choices.

Other contacts to consider are:

Alberta Agriculture
Horse Industry Branch
205, 2003 McKnight Blvd., N.E.
Calgary, Alberta T2E 6L2
Telephone: 291-4596

O.S. Longman Building
#905, 6909 - 116 Street
Edmonton, Alberta T6H 4P2
Telephone: 427-8905

Quarter Horse Association of Alberta
1506 Centre Street, North
Calgary, Alberta T0J 3H0
Telephone: 277-3001

Alberta Standardbred Horse Association
Box 1060
Calgary, Alberta T2P 2K8
Telephone: 471-5509

Canadian Thoroughbred Horse Society Alberta Division
#203, 4702 - 1st Street, S.W.
Calgary, Alberta T2G 0A2
Telephone: 287-0960

There are numerous other clubs and associations in Alberta devoted to all facets of the horse industry. If you know of any in your area, it might be worthwhile to see if they can provide resource help.

Original lesson idea by Lorna MacDougall
Modifications by AITC

TEACHER RESOURCE

SHEET ONE --

Horses in Alberta

The development of agriculture in Alberta owes a great deal to the draft horses and saddle horses that did much of the work in the province's formative years. Already established as the major form of transportation by the Plains Indians, horses became a necessary part of the ranching industry established here in the 1870s.

As the nineteenth century drew to a close and lands were opened to settlers, the romantic figure of the lone cowboy riding the range was eclipsed by the farmer working his land with strong plough horses. At the height of the horse era, about 1920, Alberta's horse population was 800,000.

The first clumsy steam tractors appeared around the turn of the century, but the horse was not replaced by mechanized equipment to any extent until lighter gasoline tractors became available. There was a rapid increase in the number of tractors on farms starting at the end of the First World War, but most farm work was still done by horses; meanwhile, farmers were replacing horses with automobiles for personal transportation. The economical horse had its last stand, both as a draft animal and as family transportation on farms, during the Depression of the 1930s. The process of mechanization was completed when Canada underwent a surge of industrialization during and after the Second World War. Horse numbers at one point dropped to one-tenth of their peak. Now, although horses are still used by working cowboys in ranch country, they are overwhelmingly raised for recreational use. The popularity of horses for leisure has increased over the past two decades to the point where horses again represent a significant economic activity in agriculture. There are more than 160,000 horses in Alberta, about the same as the number of dairy cattle.

Alberta produces the largest number of horses of any province, annually supplying about 30 per cent of the pedigreed horses registered in Canada.

The horse breeding industry returns approximately $25 million a year to producers. The part of the industry where there is the most demand, and in which there is the most potential for growth, is the production of high-quality purebred horses for sport and recreation.

By far the most popular breed in Alberta is the Quarter Horse, so named because of its ability to accelerate quickly from a standing position and maintain a high speed over a distance of one-quarter mile. The Quarter Horse is highly valued as a working ranch horse and as a pleasure horse because of its versatility and disposition. Alberta breeders have found good demand for their Quarter Horses on this continent and in Europe. About half the Quarter Horses registered in Canada yearly are from Alberta; in 1985 there were 3853 Alberta registrations.

Arabians are the second most popular pleasure breed, with Alberta producing more Arabians than any other province. Noted for their ruggedness, stamina and proud carriage, Arabians are popular show and trail horses.

Thoroughbreds, bred for speed and stamina, are used as racehorses in flat races. The breeding of racehorses is an expanding industry, with about 1200 required each year for Alberta racetracks. The racing industry represents an important economic activity with attendance of over 22 million at Alberta racetracks each year and a total of more than $200 million wagered. Standardbred horses, used for harness racing, are somewhat less common but their numbers are increasing as the popularity of the sport increases.

The third major type of horse raised in the province is the draft horse. Belgians, the most common, are the largest, weighing up to 1200 kg and standing as tall as 183 cm. Black or grey Percherons, and Clydesdales with their distinctive feathered feet are also raised. These horses are now used for recreational purposes in pulling contests and show hitches.

Although Canadians generally do not eat horsemeat, it is a popular meat for human consumption in Europe and Japan, and the $15 million worth of horsemeat produced in the province annually is almost entirely exported. Two slaughter plants in the province kill approximately 35,000 head a year, thus generating economic activity from what would otherwise be a valueless byproduct of the leisure horse industry.

The horse industry in Alberta continues to grow. Through the combined efforts of horse breeders, breed associations and the provincial government's horse industry branch, Alberta is now recognized in many parts of the world as a reliable source of breeding and performance stock.

Alberta Agriculture Publication (Agdex #FS000-26)

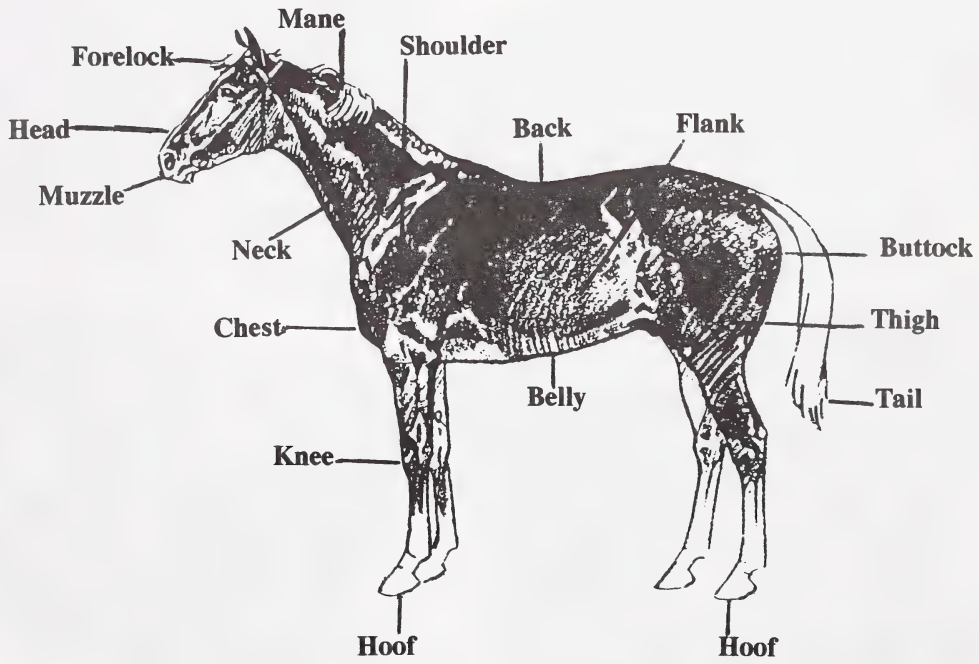
STUDENT RESOURCE

SHEET ONE --

The Role of the Horse in Today's Society

SHEET TWO --

The Body of a Horse



Activity 7

WHAT TO EAT? WHAT TO EAT?

STUDY QUESTION:

Is it possible to plan a tasty menu that meets the requirements of the Canada Food Guide, using only Alberta products?

THE ACTIVITY:

Students plan a personal menu according to Canada's Food Guide, using only Alberta food products.

CURRICULUM FIT:

GRADE FOUR - HEALTH

- Canada's Food Guide identifies and classifies foods, and selects nutritious foods.

AGRICULTURE CONCEPTS:

What is produced in Alberta?

PURPOSE:

To provide students with the opportunity to make decisions affecting their own well-being.

To provide application of student knowledge of Canada's Food Guide.

To positively influence student eating habits.

MATERIALS REQUIRED:

Copy of Canada's Food Guide, with recommendations for the age group, and list of Alberta food products.

TIME REQUIRED:

Two class periods plus homework.

BACKGROUND - For the Teacher

It might surprise some people to realize just how many food products are made or processed right here in Alberta. True, the province does import a large variety of foodstuffs, such as fruits and vegetables from California and elsewhere. Increasingly too, as Canada's ethnic balance changes, other "exotic" foods are also being imported from locales around the world. But, Alberta produces a variety of things which we eat everyday (bakery products, beverages, confections, dairy products, fish, honey, meats, pasta, vegetables and specialty foods like wild rice are only some examples). Many of these foods form the components of a nutritious diet. In this activity, students will get a chance to think about their own nutritional needs, and to have input into what they eat. In the process, they will also learn the importance of Alberta products in their daily lives.

PROCEDURE

Part 1 Preparation	1.	Review Canada's Food Guide with the students. Ensure that all students have a copy of the Guide.
Part 2 Introduction	2.	Ask the students to name several foods that they know should be included in their diet. Encourage them to name not only foods they know are good for them, but also food that they like to eat (e.g., they may know they should eat dairy products but dislike milk -- suggestions? -- yogurt or cheese).
Part 3 Activity	3.	Assign the task. Students are to plan a one-week menu for themselves which follows Canada's Food Guide and also uses only foods produced in Alberta. Introduce them to the "Alberta Made" emblem which appears on the products of many Alberta food and beverage companies. They also should try to be realistic about the money they will spend. Students may wish to include food labels from home in their reports.
Part 4 Conclusion	4.	Review students' menu plans in groups. What gaps were noticed? What recommendations can the students make to each other?

DISCUSSION QUESTIONS

1. Were you able to make a complete menu plan with only Alberta products? What foods did you have to import? (e.g., oranges)
2. What surprises did you find when you went label hunting for Alberta products?
3. Are any of your favourite foods made in Alberta? What are they?
4. How many of your menus included Alberta foods?

EVALUATION STRATEGIES

1. Participation, accuracy and thoroughness of reports.

RELATED ACTIVITIES

1. The class plans, prepares and shares an Alberta meal or snack (for Agriculture Week?).
2. What are foods/snacks to avoid?
3. Students analyze sample meals or menus and determine if they meet the requirements of Canada's Food Guide.

NOTE
You may be able to obtain a directory of various Alberta food processing and beverage companies and their products by contacting:
Agri-Food and Processing Development Branch
Marketing Services Division, Alberta Agriculture
3rd Floor, 7000 - 113 Street
Edmonton, Alberta T6H 5T6
Telephone: 427-7325

This should not be necessary, however, as the labels on most food products should be sufficient to identify their origins.

If your menu includes something like a casserole, please note the major ingredients, e.g., hamburger, macaroni, zucchini, canned soup.

Original lesson idea by Mooni Sookram
Modifications by AITC

STUDENT RESOURCE

SHEET ONE --

Weekly Menu Plan

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast							
Snack							
Lunch							
Snack							
Dinner							
Snack							
Approx. daily cost							

Activity 8

RIP VAN WINKLE VISITS AGRICULTURE IN ALBERTA

STUDY QUESTION: How has agriculture changed in Alberta over the years?

THE ACTIVITY: Students investigate and report on changes in agriculture in Alberta.

CURRICULUM FIT:

GRADE FOUR - SOCIAL STUDIES

- Technology has changed the use of agriculture resources and has had an impact on lifestyle and on the environment.

AGRICULTURE CONCEPTS: Adaptation of agriculture to a changing world.

PURPOSE: To help students develop personal research and group work techniques as they investigate changes in agriculture and their impacts on the environment (positive and negative).

MATERIALS REQUIRED: Students' initiative; library resources including Census Canada publications, back issues of Country Guide, and Atlas of Alberta; if possible, pamphlets, maps and information kits from various agriculture organizations; guest speakers; taped programs from Country Canada or The Nature of Things which relate to the topic (optional buy highly recommended). Remember to try and provide a balance of opinion.

TIME REQUIRED: Two or three class periods.

BACKGROUND - For the Teacher

This activity encourages students to view the agriculture industry as a living entity which has to evolve and respond to the environment in which it operates. It gives students an opportunity to do their own research on interesting aspects of Alberta, past and present. Students will identify physical, social and mechanical changes in agriculture. Students will be introduced to agriculture at different levels and scales. This activity may introduce students to possible career alternatives they might never have heard of otherwise.

PROCEDURE

Part 1
Introduction

1. Introduce the topic with a reference to Rip Van Winkle. If Rip Van Winkle were to wake up from a decades-long slumber in Alberta, what changes would he notice? What could we tell him about how agriculture has changed over the last 100 years? (If you are a dramatic and daring type, you could play the role of Rip Van Winkle!)

Part 2
Activity

2. The class brainstorms a few changes that come immediately to mind. You can stimulate them with questions like:
   - How big are farms and farm families today compared with those of the settlement period?
   - What kind and size of equipment is on farms today?
   - What kind of education do farmers need?
   - What kind of animals are/were present on farms?
   - What kind of equipment would you find in a farm office today?
   - What role does/did the farm spouse play? (Off farm work?)
   - Where do farmers go for supplies? To sell what is produced?
   - How do farmers take care of the soil to prevent it from blowing away?
   - How do farmers use water today?
   - How much can a hectare (or acre) of land produce today compared to the turn of the century? Why is there a change?
   - How many people work on farms today compared to the past?
3. Students may choose a particular area to investigate or may report on the entire industry. Some students may reply heavily on personal interviews and may need a bit of guidance. The class could develop an "interview plan".

Part 3
Conclusion

4. Students present their findings in a report which they may review with a partner or in small groups.

EVALUATION STRATEGIES

1. Student reports and presentations.

RELATED ACTIVITIES

1. Tour a farm.
2. Invite guest speakers to talk about life on a farm (students prepare interview questions beforehand).

Original lesson idea by Anne Cunningham
Modifications by AITC

TEACHER RESOURCE

SHEET ONE --
The Evolution of Agriculture in Alberta

Large-scale agriculture has a relatively short history in Alberta. In the mid 1870s, American ranchers began to move into southern Alberta, where they found good grazing land for their cattle herds. But cultivation of the land did not begin in earnest until the 1890s when waves of immigrants began coming to the West from Ontario, the United States and Europe.

Between 1901 and 1905, 40,000 homesteads were granted in what in 1905 became the province of Alberta. Homesteaders were given freehold title to their land in exchange for paying $10, agreeing to stay on the land at least three years, breaking a certain amount of land each year and building a house.

Wheat was the main crop of the early homesteaders. Yet, even with the introduction of the early-maturing Marquis wheat in 1907, drought, frost, diseases and pests frequently caused crop failures. Farmers began to diversify, and mixed farms with dairy cows, hogs and poultry as well as field crops became common.

By the early years of the twentieth century, the mechanical revolution was underway. Steam tractors and threshers were not uncommon sights on farms. Irrigation had also made inroads in southern Alberta. By the 1920s, gasoline tractors and other recognizable versions of modern implements were making their presence known. With the increased demand for food in the aftermath of the First World War, it was a time of optimism for agriculture.

But then, following on the heels of the 1929 stock market collapse, came the "Dirty Thirties." Low commodity prices and drought caused crop failure after crop failure. Poor land management practices over the years led to soil drifting, and many farmers were forced off the land and left destitute.

One result of the drought was the development of improved methods of soil conservation like strip farming and the planting of shelterbelts to break the wind's force. At the end of the 1930s, prosperity once more beckoned. The Second World War led to a demand for farm products, especially livestock. Bacon was especially popular.

The process of mechanization resumed full-tilt as a result of the war. The tractor replaced the horse almost completely, and the threshing crew gave way to the swather and combine, which could reduce harvesting to a two-person operation. Irrigation in the south was expanded. Telephones and electricity began spreading to rural areas. After the war, one-room schoolhouses also began to be replaced by modern, centralized schools.

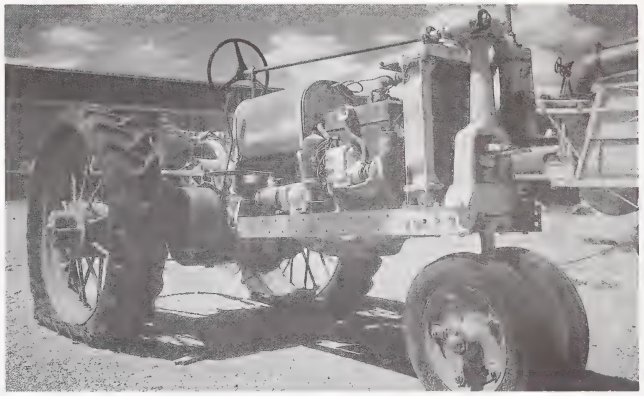
Since the war, farming has become more specialized, farm units larger and the investment required correspondingly greater. A single piece of farm equipment, such as a combine, today can cost more than $100,000 while such other farm inputs as fertilizer, pesticides and fuels can add thousands of dollars to a farmer's bills. Farmers tend to be better educated than their homesteading forebears. They often have an agricultural college or even a university education. "High technology" innovations like automated feeding systems, embryo transplantation in livestock, electronic monitoring devices on farm equipment, and micro- computers are also finding their way onto the farm. Farm families are no longer as isolated. Modern transportation and communications technology ensures that farmers have access to all the amenities that city dwellers have.

Information excerpted from "Agriculture in Alberta," an Alberta Agriculture publication -- Agdex 000-25.

STUDENT RESOURCE

SHEET ONE --

The Development of the Tractor



Activity 9

CANADIAN GRAIN MAKERS -- FEEDING THE WORLD

STUDY QUESTION: How does Canada help feed the world?

THE ACTIVITY: Students use maps, reports, Canada census, grain companies' information sources and news broadcasts to determine the nature and pattern of grain trade. Reports are in various forms, including role playing.

CURRICULUM FIT:

GRADE FIVE - SOCIAL STUDIES

- How do Canadians use their lands and natural resources?
- How do the natural resources of a region affect the occupations?

AGRICULTURE CONCEPTS: Grain production, marketing and transportation.

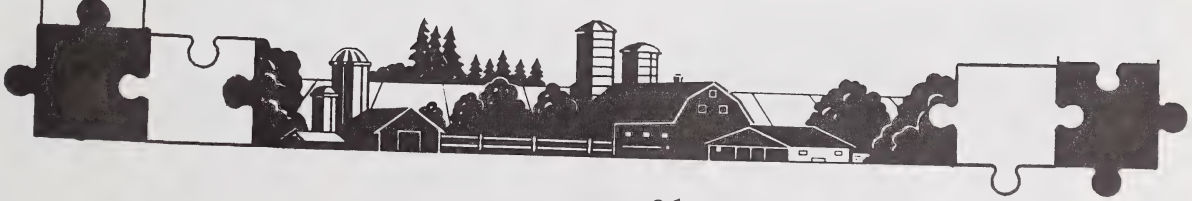
PURPOSE: To give students the opportunity to report on types of crops produced in Alberta.

To help students identify factors affecting trade in one of Canada's main export products.

To help students identify the consequences of international events on agriculture trade.

MATERIALS REQUIRED: Atlas of Alberta, Almanac, census reports, report on grain marketing (Alberta Agriculture annual reports), Alberta Wheat Pool "Students' Story of Grain" booklet.

TIME REQUIRED: Three class periods.



BACKGROUND - For the Teacher

The topic of grainmakers feeding the world is timely and appropriate. Grain has traditionally been a staple food which has nourished us from the Stone Age to the Space Age. The study of Canadian resources, physical regions and how Canadians use their land allow students to appreciate how Canada has earned the title of "Breadbasket of the World". This activity includes nine, strongly-related activities to bring the topic to life for the students and teacher.

PROCEDURE

Part 1
Introduction

1. You may want to stimulate students' imaginations by asking questions such as - What do we do with all the grain growing on Alberta farms? Show slides for illustration if you are working with an urban group.

Part 2
Activity

2. Students investigate and report on the various types of grain crops, using "Students' Story of Grain" as a starting point. Break into small groups and assign task by type of crop. Students may report in various ways to the larger groups (e.g., posters, poems, songs, maps, displays). Students could debate the merits of various crops while in a role playing mode. For instance, have students represent the different grains and debate, "Who is the best crop?"

Part 3
Conclusion

3. Using various resources, students continue their research of their particular crop to answer these questions:
   - How much of this grain is consumed in Canada and in what forms?
   - What other countries import this grain and in what volumes? What are the trends in exports to other countries of this grain?
   - What route does this grain travel to get to its buyer? What modes of transportation are used? How is grain handled during transport?
   - What problems did you discover in the marketing of this grain?

   Reports can be in writing, posters, charts, maps and graphs.

DISCUSSION QUESTIONS

1. What crops are grown in Alberta and where? What conditions does this crop need? (Consider market as well as physical conditions.)
2. How important is the production and sale of grain to Alberta and Canada?
3. Iraq was Canada's third largest grain purchaser before an embargo was placed on trading with Iraq before war in 1991. What impact would this have on the grain industry? Who would suffer the losses related to this drop in trade?
4. What grades does your family use? What "Alberta Made" grain products can you find at home or in the stores?
5. Aside from railways, what other services and businesses can you link to grain production?
6. What would a severe frost in mid-August mean to the producers of the grain you studied?

EVALUATION STRATEGIES

1. Accuracy, completeness of reports.
2. Evidence of use of more than one source.
3. Group cooperation (teacher checklist and observation).
4. Student-made projects on specific topics.

RELATED ACTIVITIES

1. Design and produce a mural illustrating the process from seed to sale incorporating all the steps in the process (farmer, harvest to market, storage, transportation, marketing methods, to name a few).
2. Mix ingredients for and utilize Salt Clay to produce a model of a particular grain seed. Paint and label accurately and clearly so that a younger student could understand.
3. Tour the Grain Academy in Calgary. Assign research tasks before the tour. Students produce reports to summarize their observations and findings.
4. Develop and demonstrate your own advertisement for a grain product. Your advertisement should demonstrate that you have knowledge in at least one area of the grain business, be it transportation, harvesting, processing or use by the consumer.
5. As part of a class field trip to at least three large food stores, compare and contrast the following information in chart form:
   - brand availability
   - price
   - ingredients
   - is it an "Alberta Made" product?
   - is it available from another Canadian source?

   Small group activity followup - in your group, review the information you have gathered and display your findings in graph form (bar, circle, line) for no more than five products.

   Health integration - Using the foods you investigated during the field trip, ascertain the nutrient quality available to the consumer and where these products fit in Canada's Food Guide groups.
6. Develop a self-chosen project for a mini-Agriculture Fair, Social Studies or Science Exhibit.
7. Create or discover a recipe which uses a cereal grain in some form and prepare the dish for either personal consumption or for sharing, as part of Agriculture Week or Multicultural Week celebrations.
8. Research, design, construct and demonstrate a self-chosen project dealing with this topic for peer/teacher perusal and assessment (e.g., model, diorama, poster, song, role play, poem, demonstration, experiment).
9. Design a poster or t-shirt or button which reflects pride that Alberta is helping to feed the world.

RESOURCES

"Students' Story of Grain" is available free of charge to Alberta school students from the Corporate Affairs Division, Alberta Wheat Pool, Box 2700, Calgary, Alberta T2P 2P5. Other resources may also be available from Alberta Wheat Pool.

For information on grain marketing, write to Alberta Agriculture, Marketing Sector, 304, 7000 - 113 Street, Edmonton, Alberta T6H 5T6, Phone: 427-4241 or 427-7325.

For research and product information write to Alberta Agriculture, Field Crops Branch, Plant Industry Division, Agriculture Building, Bag Service #47, Lacombe, Alberta T0C 1S0, Phone: 782-4641.

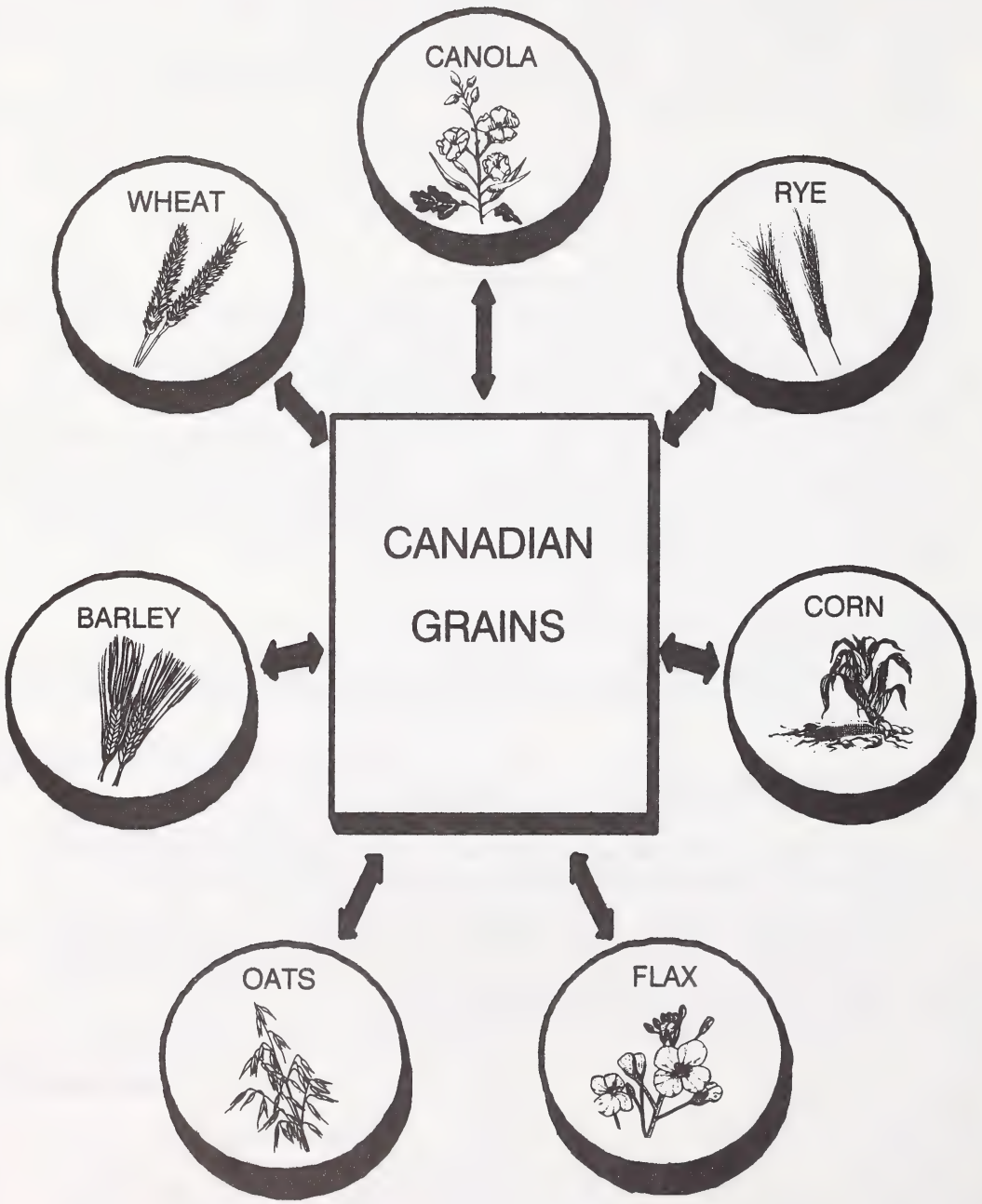
Also, Agriculture Canada, Research Station, Bag Service 5000, Lacombe, Alberta T0C 1S0, Phone: 782-3316.

For transportation information, write to Economic Development and Trade, 9th Floor, Sterling Place, 9940 - 106 Street, Edmonton, Alberta T5K 2P6, Phone: 427-0741.

Original lesson idea by Bruce Wilson
Modifications by AITC

STUDENT RESOURCE

SHEET ONE --



Activity 10

THE GREAT TASTE TEST

STUDY QUESTION: How do food processing companies decide what products to market to consumers? How do commercial products compare to home-made products?

THE ACTIVITY: Students conduct a taste test using commercial and home-made products.

CURRICULUM FIT:

DIVISION THREE - SPECIAL ACTIVITY
(Primarily Health & Home Economics)

- Research and report information.
- Discern differences, find percentages, present and interpret information in graphs.
- Identify practical difficulties in food handling and preparation.

AGRICULTURE CONCEPTS: Food processing, marketing, consumer convenience.

PURPOSE: To give students the opportunity to develop their research and presentation skills while learning about the processing of agricultural products.

MATERIALS REQUIRED: Samples of products to be tested (yogurt, ice cream, muffins, etc.), containers for samples, eating utensils, clean-up supplies, poster paper, marker pens, paper and pencils, supplies for making products (refer to rest of lesson).

TIME REQUIRED: Two to three class periods.

SPECIAL NOTE
Food allergies or dislike of the food product chosen may prevent some students from participation in a taste test, but other features such as the food's appearance can be evaluated. This activity can be planned so that all students can be actively and constructively involved without feeling left out.

BACKGROUND - For the Teacher

Consumers, your students among them, make hundreds of choices daily without considering the many factors influencing those decisions. This activity gives the students a chance to see how food manufacturers and marketers work to influence those choices and to make their food item the most desirable one on the shelf. The activity also allows students to make their own foods, which they can compare with the commercial varieties. The students will learn valuable lessons in the safe handling and preparation of foods. They will be able to see that bacteria can be both "friendly," as in the making of yogurt, or harmful. This activity is suitable for a whole class to be involved in, either as food preparers or testers.

PROCEDURE

Part 1
Introduction

1. Introduce the topic with the drawing "Agricultural Production and Consumption Cycle" (attached at end of lesson). Ask the students to apply the cycle to food products they are familiar with (e.g., chickens are grown on Alberta farms, sold and transported as a large group, are killed, cleaned, inspected and graded, sold to a fast food chain, are made into burgers, and are purchased by consumers who have seen them advertised on television).

Part 2
Activity

2. It costs a lot to introduce a new product to the market. Many new food products are brought onto the Canadian market each year, and some fail. Obviously, manufacturers like to reduce the failure rate. One of the ways they do this is to conduct taste tests on consumers.

QUERY
"If we were to conduct a taste test, what are some of the things we'd have to consider?" (e.g., safe and appropriate storage of product, cleanliness, fairness and accuracy, possible food allergies, what are we testing for?, impartiality of testers, peer pressure regarding opinions about the product, reading ability of subjects).

3. Students devise tests, including questions and procedures which will ensure their findings about food quality are valid and accurate.
   Possible test areas include:
   (1) flavour only
   (2) appearance only
   (3) attractiveness of container
   (4) attractiveness of ads for the product.
4. Students prepare their own foods and obtain the commercial varieties. (Procedures for yogurt preparation are included.) Then, students conduct the tests. (See the sample survey sheet at end of lesson for ideas on doing the tests.)

Part 3
Conclusion

5. Students record study data and present results in graphs or charts.
6. Introduce the fact that market testing is one of the costs of food production. It is also a potential employment opportunity for interested people.

DISCUSSION QUESTIONS

1. Why do companies test for things other than just flavour or healthfulness of the food?
2. What factors affect a person's liking/disliking a food? Or trying a food? What are consumer reactions to products that do not live up to expectations?
3. If you are trying to encourage parents of people your age to buy a product, what message would you try to convey in your ads? (e.g., healthy and nutritious, convenient, safe?)
4. If you were trying to encourage people your age to buy a product, what message would be in your ads? (e.g., fun, tastes awesome, non-fattening, it's "cool" to eat this?)
5. What encourages you to try a product? (Marketing appeal such as attractive containers and catchy ads?) What encourages you to continue using a product? (Quality and care in production and processing, low cost, brand loyalty?)
6. What differences were there between your yogurt and the commercial variety? How do you explain this? (This is an opportunity to point out that the food industry strives to provide uniformity in the quality of its products. You could also point out that consumers may buy ready-made yogurt from stores because it is more convenient and saves time.)
7. Is the yogurt you made more "natural" than that which we could buy in the store? What is "natural" food?

EVALUATION STRATEGIES

1. Participation in discussion, planning, conducting, summarizing tests.
2. Written reports on the projects.

RELATED ACTIVITIES

1. Instead of making yogurt, make muffins or bake bread using quick-rising yeast (the rising of the bread is actually detectable within a class period if the ingredients are ready to go at the start of the class and warm liquid is used).
2. Tour a food processing plant to learn the stages the product goes through. How is that product market-tested?
3. What are the processes a tank of milk goes through before it reaches the store shelf as a serving of yogurt? Present your findings in poster form.
4. Create an ad for a dairy product which is aimed at your age group.

Original lesson idea by Marilyn Henry
Modifications by AITC

TEACHER RESOURCE

SHEET ONE --
Food Preparation Procedure: Yogurt

(This procedure assumes that a discussion of micro-organisms and safe food-handling procedures has taken place).

Get large bowl, spoon, food thermometer, fresh plain yogurt, one litre whole milk, plastic wrap, and a means of keeping the yogurt at a steady warm temperature for at least eight hours. Or, use yogurt starter and follow its specific directions.

a) **Rinse all equipment with very hot water and cover with a clean cloth. Ensure the counter or tray surface is well cleaned.**

b) **Heat the milk to 82° C (180° F). Let cool down to 42-44° C (108-112° F). Heating the milk kills bacteria and destroys milk enzymes that inhibit yogurt fermentation.**

c) **Mix the "starter" yogurt into one cup of the heated milk. Stir well. Then blend this mixture into the rest of the milk.**

d) **Cover and seal with plastic wrap.**

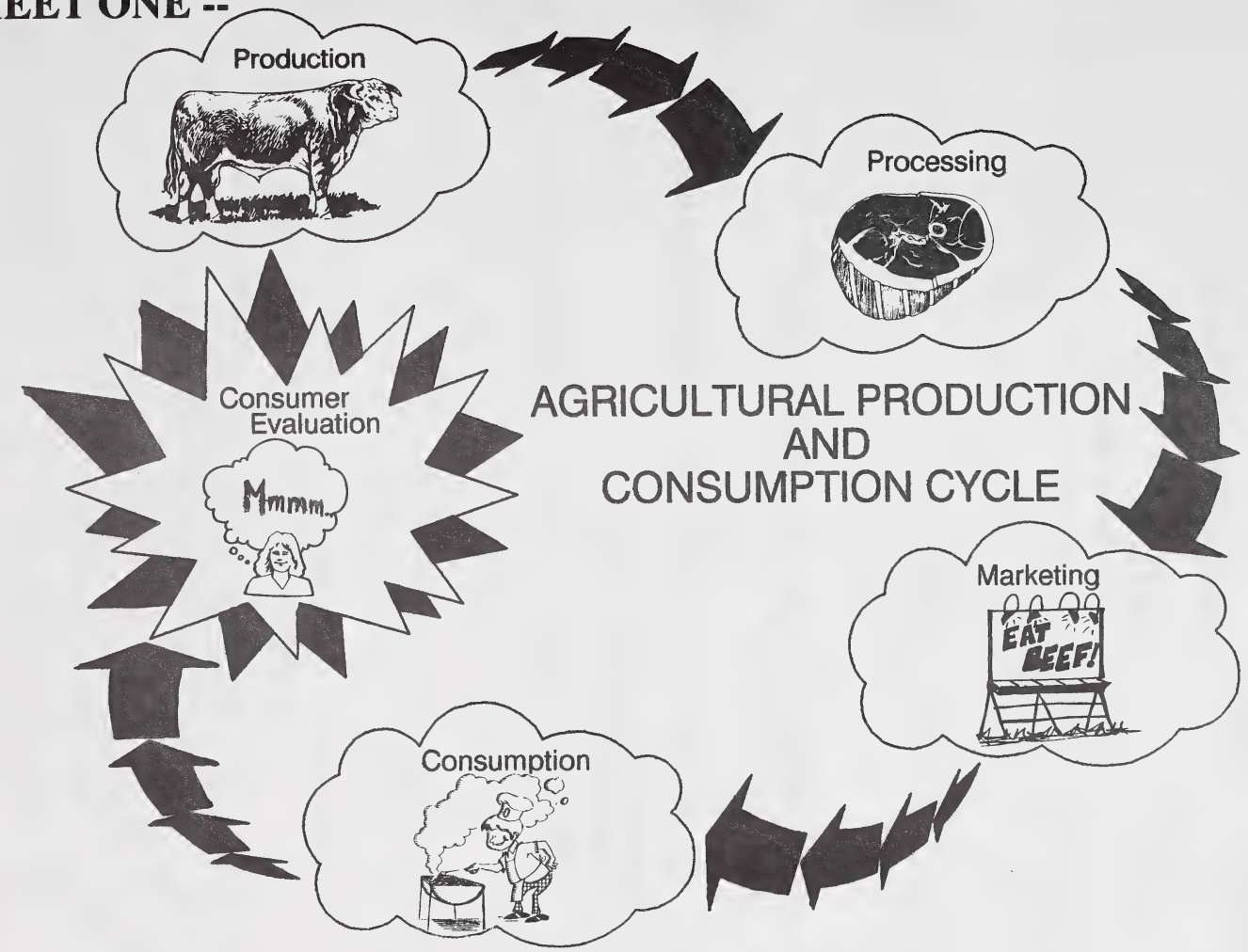
e) **Cover with a towel and incubate, undisturbed, for at least eight hours. (You can take out small samples at different times and label and refrigerate them. What differences do you note between four-hour/eight-hour/twelve-hour yogurt?)**

f) **Refrigerate the yogurt for several hours before testing.**

g) **Students may modify the basic yogurt with various fruits, honey, chopped nuts and cinnamon. Then, they examine the product, comparing it to commercial varieties. (Consider texture, colour, thickness, smell and taste.) Check the commercial label to help explain any differences.**

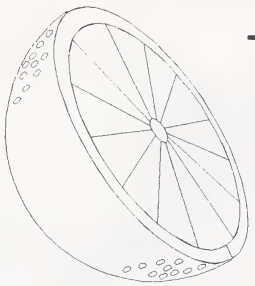
STUDENT RESOURCE

SHEET ONE --



SHEET TWO --

Sample Survey Sheet



TASTE

Product Being Tested_____

(Circle)

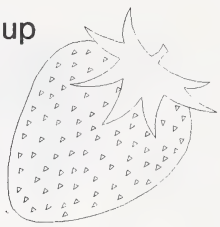
Excellent Okay Didn't Like It

Total Percentages of Your Group

Excellent ___%

Okay ___%

Didn't Like It ___%



APPEARANCE OF THE PRODUCT

Product Being Tested _____

(Circle)

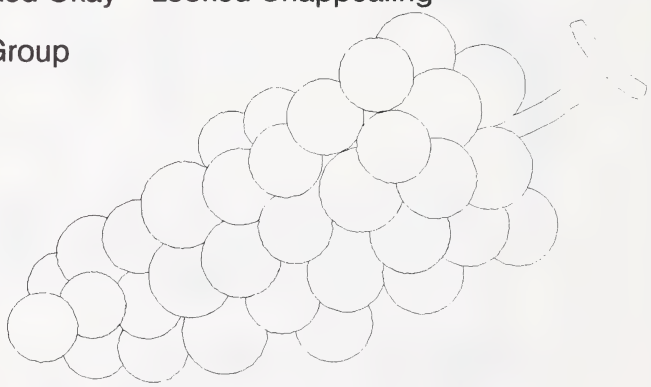
Looked Appealing Looked Okay Looked Unappealing

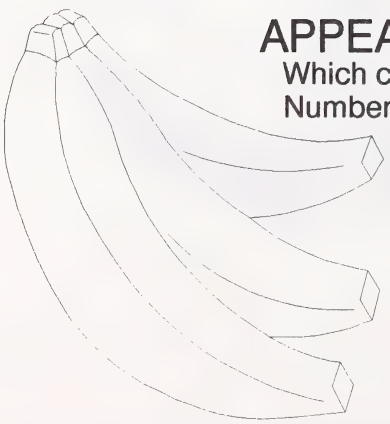
Total Percentages of Your Group

Excellent ___%

Okay ___%

Didn't Like It ___%





APPEARANCE OF THE CONTAINER

Which containers are most attractive to you?

Number your most favourite as 1, your next favourite as 2, and your least favourite as 3.

Containers Being Tested

(1)____ (2)____ (3)____

Activity 11

MILLING AND MUFFINS

STUDY QUESTION:

How is flour produced? How do products made from hand-milled flour compare to those made from industrially-milled flour?How do they compare to commercially-baked products?

THE ACTIVITY:

Students bake muffins using flour they have ground themselves and a second batch using purchased flour. They compare these two samples to each other as well as to purchased muffins.

CURRICULUM FIT:

DIVISION THREE - HOME ECONOMICS

- Food handling.
- Processing.
- Marketing.
- Nutrition.
- Time management.

GRADE NINE - SOCIAL STUDIES

- Industrialization and technological change.

AGRICULTURE CONCEPTS:

Production, processing and marketing systems.

PURPOSE:

To introduce students to the processing of one of their daily foodstuffs -- flour.

To help students develop an appreciation for the time-savings that we enjoy from industrialization (by hand-milling their own flour).

To help students develop evaluation skills by having them compare baked samples.

MATERIALS REQUIRED:

Wheat, a means of grinding it (coffee grinder or blender), finished products of wheat (pasta, bread, muffins, etc.), baking supplies for muffins (recipe follows), "Flour Milling" (attached). Optional, but recommended, materials include "Students' Story of Grain" booklet, films "Grainmakers" and "Sharing the Dream," and the kit "The Flour Milling Process." (See resources for more details.)

TIME REQUIRED:

Two class periods.

BACKGROUND - For the Teacher

Grain products figure highly in Canada's Food Guide and in Canadians' everyday diets. This activity introduces students to the processes that provide them with a safe, high-quality product while saving them valuable time. The activity has the potential to encourage healthier eating habits through the emphasis on attractive foods which fit within Canada's Food Guide recommendations. Students develop observation and evaluation skills through their comparison of the three baked goods.

PROCEDURE

Part 1 Introduction	1.	Ask students to brainstorm for products that are made with wheat. As they correctly guess, you can list those items on the blackboard. Or, if you have actual or pictorial representations of those products, you can display them. Ask students to consider how many wheat products they might have consumed in the last three days. Be sure to discuss some foods that you are sure your students enjoy, such as pizza made with a wheat flour crust.
Part 2 Activity	2.	Determine which flour is "better" -- that which we ground ourselves or that which was ground for us by a mill? To do this test, students grind wheat to produce enough flour to make a batch of muffins. (Be careful they do not burn out the motor of the machine they are using to grind.) Students compare their flour visually to commercially-milled wheat flour. (Save a bit in a container for later observations or display.)
	3.	Using the same recipe, techniques, equipment and oven, volunteer students bake one batch of muffins with the students' own flour and one batch of muffins with the commercially-milled flour.
	4.	In the same manner as commercial food labels, students list by volume the ingredients in the recipe they used. Compare their label to the label on the purchased muffins. They should keep the differences in mind when comparing the products.
Part 3 Conclusion	5.	Students judge the baked products after generating a simple evaluation form with several criteria, such as taste and appearance. They can also include store-bought muffins in their evaluation. To avoid bias, the muffins could be labelled on the bottom of their plates. All the products to be tasted should be at the same temperature. (The actual taste test could take place on day two. All muffins could be frozen and then thawed for judging.)
	6.	Debrief the activity using discussion questions.

DISCUSSION QUESTIONS

1. Which muffins would be "healthier" for us? Support your answer.
2. The commercial milling includes several processes for cleaning the wheat. What provisions did we make for this? How clean was our flour?
3. We are obviously capable of making our own flour. Why don't we? (Introduce the point that some of the things we pay for in the grocery story are convenience, safety and consistency.)
4. What different types of flour can you name? (Suggest a trip down the flour aisle to check all the varieties available to consumers.)
5. What does the term "enriched flour" mean? Why do they enrich flour for us?

EVALUATION STRATEGIES

1. Participation, discussion.

RELATED ACTIVITIES

1. For a multicultural approach, investigate (and make?) flour-based foods from different cultures (e.g., pita bread, chapatis, tortillas, pyrogies).
2. Investigate the different parts of a grain of wheat, using diagrams and/or actual grains and a microscope.
3. Visit a flour mill if you have one in your area.

Original lesson idea by Pat Threlfall
Modifications by AITC

RESOURCES

"Students' Story of Grain" is available free of charge to Alberta school students from the Corporate Affairs Division, Alberta Wheat Pool, Box 2700, Calgary, Alberta T2P 2P5. The films "Grainmakers" and "Sharing the Dream" are also available through the Alberta Wheat Pool.

"The Flour Milling Process" kit shows each step of the milling process. Products are mounted in plastic bubbles on a cardboard backing, while the text is illustrated with diagrams and pictures.

Kits are available from:

Agrikit International
201 - 435 Berry Street
Winnipeg, Manitoba
R3J 1N6
Phone: (204) 889-3013
Fax: (204) 888-0715

STUDENT RESOURCE

SHEET ONE --

Basic Recipe for Muffins

These thrive on minimum mixing.

Ingredients

500 ml flour	50 ml sugar
15 ml baking powder	1 egg
2 ml salt	250 ml milk

50 ml melted fat or salad oil

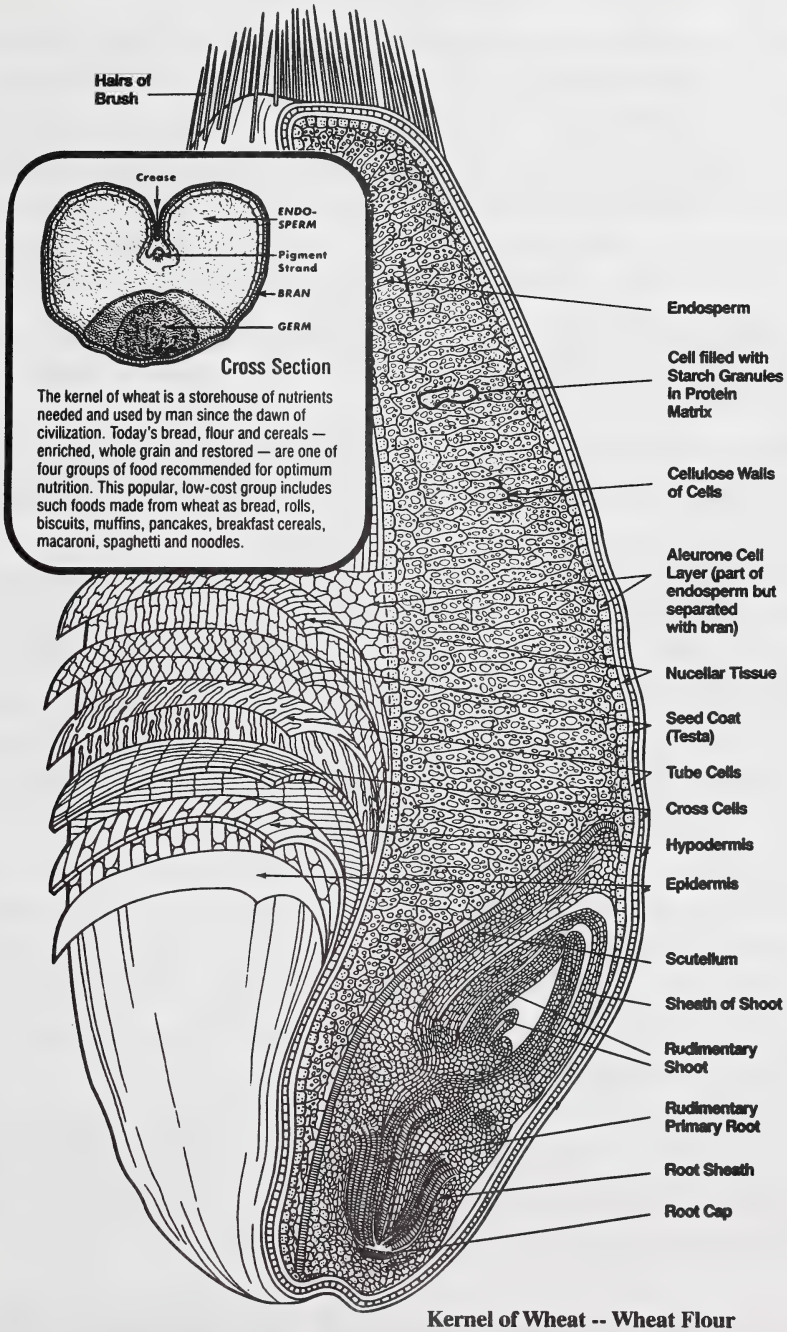
Procedure

1. Preheat the oven to 190° C (400° F); grease muffin tins on the bottom only.
2. Measure the flour; mix and sift the dry ingredients.
3. Beat the egg; add the milk.
4. Pour the liquid ingredients into the dry; add the fat; stir just enough to blend the ingredients but not to produce a smooth batter. Do not beat.
5. Fill muffin tins 2/3 full. The batter must not stand before it is in the muffin tins, but a few minutes after it is in the tins will do no harm.
6. Bake at 190° C (400° F) for about 20 minutes until the muffins come away from the sides of the pan and are a golden brown colour.
7. Turn out on a cake rack; serve. Makes 10 medium or 18 small muffins.

STUDENT RESOURCE

SHEET TWO --

Cross-Section of a Wheat Kernel


Hairs of Brush
Crease
ENDO-SPERM
Pigment Strand
BRAN
GERM
Cross Section
The kernel of wheat is a storehouse of nutrients needed and used by man since the dawn of civilization. Today's bread, flour and cereals — enriched, whole grain and restored — are one of four groups of food recommended for optimum nutrition. This popular, low-cost group includes such foods made from wheat as bread, rolls, biscuits, muffins, pancakes, breakfast cereals, macaroni, spaghetti and noodles.
Endosperm
Cell filled with Starch Granules in Protein Matrix
Cellulose Walls of Cells
Aleurone Cell Layer (part of endosperm but separated with bran)
Nucellar Tissue
Seed Coat (Testa)
Tube Cells
Cross Cells
Hypodermis
Epidermis
Scutellum
Sheath of Shoot
Rudimentary Shoot
Rudimentary Primary Root
Root Sheath
Root Cap

Kernel of Wheat -- Wheat Flour
Institute of Millers' National Federation - Xeed Productions Inc.

STUDENT RESOURCE

SHEET THREE --

Flour Milling

Wheat has been cultivated and milled by man for thousands of years. The flour and other products produced by the milling process have nourished countless generations. Such staples as breads, cereals and pasta are all made with wheat.

The inside of the wheat kernel, or the endosperm, is used in the production of flour. The outside part, known as bran, is often removed from the kernel and used for animal feed, but it can also be milled with the endosperm to produce whole wheat flour. The germ is the sprouting section of the seed, but it is usually separated from the rest of the kernel.

The earliest grain-milling implement was probably the mortar and pestle. Over hundreds of years, more efficient implements were developed.

The hand quern, for example, ground grain using rotary motion. Between 200 and 100 B.C., mechanical power sources such as the water wheel were used to turn millstones. Windmills were also developed.

Then came steam engines, which could grind large quantities of wheat. Larger and larger mills were built. As technology advanced, steel rollers began to replace the millstones. Today, mills are fully mechanized, and can produce flour and other wheat products in prodigious quantities compared to the mortar and pestle.

Before the modern milling process begins, wheat is cleaned, scoured and tempered. Weed seeds, dirt and other material are removed, and the dirt and fine hairs on the wheat seeds are scoured off. Tempering increases the moisture content of the wheat, making it easier to mill.

After entering the mill, the wheat is crushed by steel rollers and then sifted through screens of increasing fineness. The idea is to separate the bran from the endosperm as much as possible. Once this is done, the products are sent through the purification system.

The process separates the pure stocks, which are entirely free of bran, from the impure stocks which consist of the endosperm with pieces of bran attached. The bran is removed for the purposes of providing as white a flour as is possible.

The pure stock (also known as middlings) is then fed through smooth steel rollers which reduces it further. After this, the ground stocks are separated on finely-woven sieves. Any material not fine enough to sift through as flour is sent back for more processing.

Since white flour is demanded by consumers, the flour is bleached by adding a gas or powder to oxidize the carotene pigment. Refined white flour is often enriched to meet standards that call for a certain level of iron, niacin, thiamine and riboflavin, some of which have been removed with the bran in the refining process.

About 75 per cent of the wheat is made into flour, with the remainder representing products like bran and wheat germ. The products that come from various points in the mill flow can also be combined to produce different types of flour. For instance, Bakers' Patent is used for making bread rolls, while First Clear is used for making brown bread and rye bread. Animal foods are also produced using the products of the milling process.

(Information taken from "The Flour Milling Process" kit produced by Xeed Productions, Inc.)

Activity 12

A SWEET DEAL

STUDY QUESTION: How does honey get to its consumers and in what forms? What are the other benefits of beekeeping?

THE ACTIVITY: Students research all the forms that honey takes; how honey is marketed and used.

CURRICULUM FIT: **DIVISION THREE - AGRICULTURE: LAND AND LIFE**

- Production, processing and marketing.
- Diversity of the agricultural enterprise in Alberta.
- Safe food consumption.
- Developing consumer skills.

AGRICULTURE CONCEPTS: Production, processing, marketing, management and cooperation with nature.

PURPOSE: To familiarize students with the various forms of a familiar food - honey - and the extra benefits of beekeeping.

MATERIALS REQUIRED: Samples of honey in various forms (comb, liquid, cream, in granola, shampoo, yogurt, cosmetics, baked goods).

TIME REQUIRED: One to two class periods.

BACKGROUND - For the Teacher

Most people would think of honey as the primary product of beekeeping. But in terms of value, the bees' accomplishments of pollinating crops far exceeds that of honey and other by-products. The "simple bee" is a king pin in the agriculture industry.

This activity alerts students to the adaptability of one food and will reinforce the fact that working with food can require the approach and skill of a chemist or researcher. The consumer skill of label reading is introduced.

PROCEDURE

Part 1 Introduction	1.	Pre-class assignment. Students survey the cupboards at home or the grocery or drug store to determine the various forms honey is sold in. Students also watch for and record the ways in which honey is advertised (e.g., Honey Nut Cheerios). (Teacher could fill in the gaps in the discovery.)
Part 2 Activity	2.	Students write short reports. A collage of labels or sample containers is optional.
	3.	Students view display of honey products. Taste opportunities?
Part 3 Conclusion	4.	Split into small groups and assign each group one or two products to consider the following question - What are some other ways that honey could be successfully marketed? (What other forms could it take and what might new ads look like?) Each group does a report in oral or poster form.

DISCUSSION QUESTIONS

1. Considering the condition that honey comes in from the hive, what kind of processing was necessary to get it to the forms we see before us? (Read labels for hints.)
2. How many ways does your family consume honey? Has this changed in recent years?
3. Honey is one of two food sweeteners produced in Alberta. What is the other one and where is it produced? (sugar beets, Southern Alberta)
4. What would be the significance to agriculture if honey producers stopped their operations? (severely reduced pollination of field crops) What impact would this have on the rest of Alberta?

EVALUATION STRATEGIES

1. Participation in the pre-class assignment.
2. Discussion contributions.
3. Poster quality.

RELATED ACTIVITIES

1. Tour honey processing plant or apiary.
2. Borrow model of hive for class demonstration.
3. Test recipes that feature honey for Agriculture Week (recipe for Healthy Honey Cookies - attached).
4. View films available from Alberta Agriculture Film Library.

STUDENT RESOURCE

SHEET ONE --

FACT SHEET

Value of Honey Bees to Canadian Agriculture

- it is estimated that $1.2 billion of crops are dependent on honey bees for pollination (Winston, L.W. and D.D. Scott, 1984). The value of bee pollination to Canadian Agriculture. Canadian Beekeeping 11;134.

Interesting Facts about Bees and Honey

- Alberta is the leading honey producing province in Canada.
  - the first settlers brought honey bees with them, since they were so valued a possession.
    - a hive produces up to 90 kg of honey on average.

- bees appear to be able to communicate to each other about the location of food sources in the way that they "dance" at the hive. They appear to use the sun as a reference point, e.g., turning around in a circle clockwise might mean that food is ahead, to the right of the sun.

- there are three castes of bees -- the queen, the workers and the drones.
  - the queen lays all the eggs that develop into workers, drones and new queens.
    - the drones mate with the queen bee.

- the workers feed the larvae, build new wax combs, cap brood and honey cells, process nectar and pollen for storage, feed queen and drones, remove dead brood, adults and foreign material from the hives, ventilate and defend the colony.

- a honey bee sting is only 3 mm long.
  - some people are allergic to bee stings. Other people can become allergic after being stung.
    - bee venom is an important product. It is used to desensitize people against stings.

To avoid getting stung:

- avoid hives in wind, rain or before a storm
- move slowly
- wear light coloured clothing
- if possible, use a beekeeper's smoker to calm bees
- if a bee stings your clothing, wet the area with water to dilute the pheromones which would attract other bees
- beekeepers wear special suits, hats, veils, and gloves, and tuck their pant legs into their boots for protection

Helpful Terms

Hive - holds a colony of bees. Hives, whether built by bees or by man, are designed to protect the bees and the honey. Man-made hives are usually made of wood and are also designed to control bee movement.

Colony - the social unit of the bee, comprised of the queen, the drones and the workers.

Frames - structures which fit inside the hive and hold the wax and honey. Frames lift out so that the honey can be extracted. Frames are reusable.

STUDENT RESOURCE

SHEET TWO --

Healthy Honey Cookies

125 ml butter or margarine
125 ml shortening
125 ml brown sugar, firmly packed
125 ml honey
2 eggs
5 ml vanilla
375 ml whole wheat flour
5 ml salt
5 ml baking soda
2 ml cinnamon
375 ml granola
250 ml raisins or dates
250 ml coconut
175 ml coarsely chopped peanuts or pecans

Turn on oven to 190° C. Cream butter, shortening, brown sugar and honey in a large bowl. Add eggs and vanilla and beat well. Add flour, salt, baking soda and cinnamon (it is best to sift these together into the bowl). Beat until smooth and well blended. Stir in the remaining ingredients. Drop by heaping teaspoonful onto a lightly greased cookie sheet. Bake at 190° C for 10 to 12 minutes or until lightly browned. Yield: about six dozen cookies.

STUDENT RESOURCE

SHEET THREE --

Beekeeping in Alberta

Beekeeping has expanded greatly in Canada during the last 35 years, particularly in western Canada. In that time the centre of beekeeping has shifted from Ontario to Alberta.

Alberta accounts for 30 per cent of the honey produced in Canada. There are approximately 1,600 beekeepers in Alberta and the value of honey and beeswax in 1984 was over $13.5 million.

The beekeeping industry in Alberta has two primary values to agriculture. The first and most visible is the production of honey. The second is the pollination provided by the honey bees as all small-seeded legumes require insects for cross-pollination.

There are basically two categories of beekeepers: (1) hobbyists and sideliners, keeping up to 200 hives; and (2) commercial beekeepers, with at least 200 hives, deriving all or most of their income from beekeeping. Commercial beekeepers represent approximately 10 per cent of the apiarists in Alberta.

Most areas in the province are suitable for beekeeping except the non-irrigated drylands of east-central and southeast Alberta. Best honey yields have been recorded under warm sunny days and cool night conditions during the honey flow period. Bees are located in areas where forage crops and other flowering crops are common. Willow and dandelion are important sources of pollen and nectar during spring buildup of colonies, while crops like canola, alfalfa, clover and fireweed are the major sources of nectar in the summer and fall.

In the average year, about 10 per cent of Alberta's honey is produced in southern Alberta. The central region from Wetaskiwin to Strathmore produces another 10 per cent of the total crop while the region north of Wetaskiwin to Athabasca and the Peace River region each produce up to 40 per cent of the Alberta crop. The Peace River region has some of the largest operations, running up to 4,000 colonies or more, as well as the highest production potential per colony, with yields of 110 kg per colony not uncommon. The long summer days and the abundance of bee pasture contribute to the heavy yields of honey.

Most of the colonies in Alberta are still started from package bees imported annually from California in the spring. However, many beekeepers now winter their bees, thereby gaining stronger colonies in the spring and reducing their dependence on an uncertain supply of imported bees.

Most commercial operators market their honey in bulk through beekeeper co-operatives and private honey packers although some export directly to other countries. Small quantities of honey are sold directly to the consumer, especially by hobby apiarists.

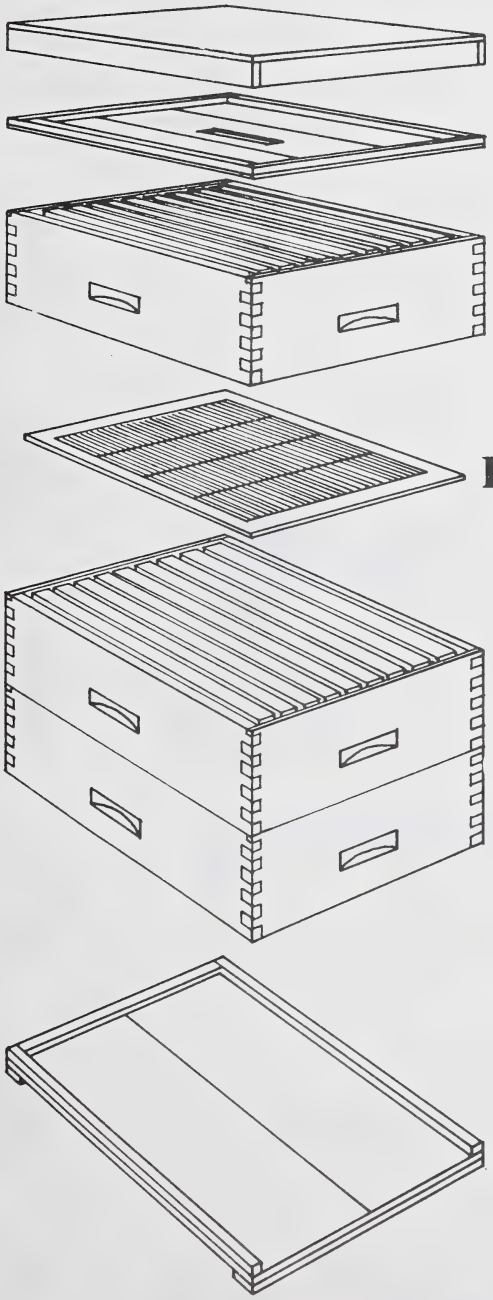
Approximately 22 per cent of the crop is used within the province, 26 per cent is sold to other provinces, and 52 per cent is exported, primarily to the United States, with some to Europe and Japan.

(Reproduced from Agdex 000-18)

STUDENT RESOURCE

SHEET FOUR --

Components of the Standard Bee Hive



A. Telescoping Hive Cover

B. Inner Cover

C. Honey Super

D. Queen Excluder

E. Two Brood Chambers

F. Bottom Board

Reference: **The Prairie Beekeeping Manual** - Alberta Agriculture, Saskatchewan Agriculture, Manitoba Agriculture

STUDENT RESOURCE

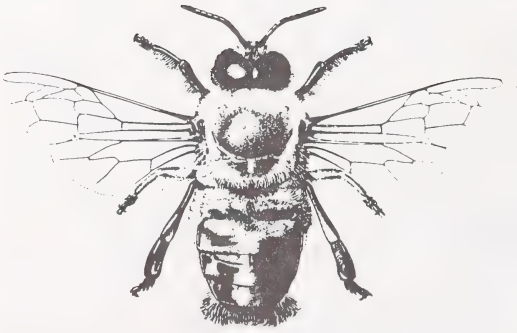
SHEET FIVE --

The Three Castes of the Honey Bee

(Taken from Dade, 1977)

A. Queen

B. Worker



C. Drone

Activity 13

LAND USE ISSUE -- EROSION

STUDY QUESTION: What are the issues at stake when land use decisions can have a negative impact on the land itself?

THE ACTIVITY: Students debate the issues regarding land use decisions.

CURRICULUM FIT:

GRADE EIGHT - SOCIAL STUDIES

- People are constantly interacting with their physical environment to meet their needs.
- Resource development and potential consequences.

AGRICULTURE CONCEPTS: Care of the land resource; erosion.

PURPOSE: To help students recognize that land use decisions are affected by many factors and that decision-making may not be as simple as it first appears.

MATERIALS REQUIRED: Photograph of the region to be used as the example in the debate (sample included); role cards for students (samples included); copy of the Soil Conservation Act or relevant sections (optional).

TIME REQUIRED: Two class periods.

NOTE
Before doing this lesson, you may wish to look at the other soil erosion lessons in this book: "Evidence of Erosion" and "The 'Domino Effect' of Soil Erosion."

STUDENT RESOURCE

SHEET TWO --

Role Cards

Sandra Farmer

You and your husband bought this farm about five years ago. Part of your farming plans include getting the most acres possible into cultivation. This year this means that the side of a valley you own needs to be cleared and prepared for planting crops, hopefully next year. You and your husband had just arranged for a bulldozer to come in and knock down the brush when you were informed that a group of local citizens (non-farmers) have filed a complaint. You are not being allowed to continue.

Your next-door neighbour is a bird sanctuary which is the nesting grounds for a nearly-extinct bird. Some of the complainers are members of the birdwatching club.

You are furious. You don't think it is anyone else's business what you do with your land, especially when your intent is to grow food for them to buy at bargain basement prices! This delay is costing you money and you are in a tight financial pinch to begin with.

You and your husband consider yourselves good farmers. You plan to work the land to prevent erosion. You have handled erosion problems with success and have even planted a couple of windbreaks on the farm. What's all the fuss about?

1. Be prepared to tell the panel how you plan to prevent wind and/or water erosion on your land.
2. What will you do if erosion does start to happen? Immediately and over the long term?
3. Work with your role card "husband" to prepare your talk to the panel.

Robert Farmer

You and your wife Sandra bought this land about five years ago. Part of your farming plans include getting the most acres possible into cultivation. This year this means that the side of a valley you own needs to be cleared and prepared for planting crops, hopefully next year. You and your wife had just arranged for a bulldozer to come in and knock down the brush when you were informed that a group of local citizens (non-farmers) have filed a complaint. You are not being allowed to continue.

Your farm is in a tight financial corner and you need to bring as much land into production as possible.

You are furious. You don't think it is anyone else's business what you do with your land, especially when your intent is to grow food for them to buy at bargain basement prices!

You and your wife consider yourselves good farmers. You have handled erosion problems with success and have even planted a couple of windbreaks on the farm. You plan to work the land to prevent erosion. What's all the fuss about?

You have a diploma in farm management from an agricultural college. You are a member of Conservation 2000 club, an organization which promotes good farming practices.

1. Be prepared to tell the panel how you plan to prevent wind and/or water erosion on your land.
2. What will you do if erosion does start to happen? Immediately and over the long term?
3. Work with your role card "wife" to prepare your talk to the panel.

STUDENT RESOURCE

SHEET THREE --

Role Cards

Sam Sparrow

You represent the local birdwatching club. The bird sanctuary is next to the land in question. The sanctuary is the nesting grounds for the Pink-Eared Twitter Bye Bird, which is near extinction.

Your club is concerned that if the farm land in question is brought under cultivation it will blow away with the wind and that the ensuing dust problems will discourage the nesting of the Twitter Bye Bird. You are also concerned that if wind erosion gets a start on the farmland it will start to work at the edges of the bird sanctuary and soon you will have it blowing away too.

You don't see why the Farmers need to break up this land. They have lots of other land.

Janice Spotter

You are a nature photographer and have worked all over Canada. Your concern is that a very attractive location is about to be ripped up and put into cultivation. Because this land is visible from the road, you have seen it hundreds of times and the small grove has become a landmark for you. You have photographed it many times and even won a contest with a picture of it last year.

You can also imagine that once this land is worked up that it will blow away and that no one will benefit.

SHEET FOUR -- STUDENT RESOURCE

Role Cards

Pat Position

You are the local agriculture fieldman (or district agriculturist). You have been called to give your professional (not personal) opinion about the plans for the Farmers' land. You are familiar with the Farmers and have visited their operation three times in the last five years.

The Farmers have made many improvements with their farm, including improving buildings, planting a couple of windbreaks and ripping up a few fields to help the water percolate down through. They did have a wind erosion problem in a field about half a mile from the land in question but immediately seeded it back into pasture and the problem subsided.

The soil on the land in question is thin black soil and can have problems if not properly managed. You would recommend that the Farmers use it as grazing and hayland with rotation into cereals, practicing minimum tillage and chemical weed control as necessary, but you cannot predict the future of the land with any certainty. You respect the Farmers as farmers and think they are sensible people.

Activity 14

EVIDENCE OF EROSION

STUDY QUESTION: What causes/prevents erosion of the soil?

THE ACTIVITY: Students experiment with various soil conditions to discover what causes or prevents erosion of the soil. The focus is on erosion by water.

CURRICULUM FIT:

GRADE SEVEN - SCIENCE

- Infer processes that have led to major erosional features.
- Recognize, describe and identify the process of weathering.
- Recognize evidence of erosion.

AGRICULTURE CONCEPTS: Erosion/conservation of soil.

PURPOSE: To introduce the topic of soil erosion/conservation.

To identify the impact on lives of rural and urban people.

To stimulate feelings of ownership of resource management.

MATERIALS REQUIRED:

At least four 9 x 13" cake tins
(or similar uniform containers)
One catch basin per cake tin used
(large plastic containers are good)
Soils for cake tins
Watering can (to simulate rain)
Straw/sticks (to simulate stubble, ground cover)
One clump of sod to fit one cake tin
Bulletin board and pictures supplied by students
(optional)
Access to sinks for clean-up
Teacher resource "Water Erosion in Alberta" (attached)

TIME REQUIRED: Up to three class periods.

NOTE
This lesson can be used in conjunction with the other soil erosion lessons in this book: "The 'Domino Effect' of Soil Erosion" and "Land Use Issue -- Erosion".

BACKGROUND - For the Teacher

Erosion is a natural process which has continually changed the face of the earth since time began. It has produced such memorable features as the Badlands in Alberta, Niagara Falls and the Grand Canyon.

Erosion can be accelerated by the actions of man and animals. It can become a problem when soil erodes more quickly than nature replaces it. The "Dirty Thirties" was a period in Canada's history when cultivation practices in newly-cleared land and an unusually dry climate combined to provide the "perfect" conditions for wind erosion.

The industries which use the land resource are developing new procedures and resurrecting old ways to protect the soil while conducting their operations. Agriculture is one of these industries.

This activity introduces the topic of soil erosion and how it affects all Albertans, and encourages students to take responsibility for this resource.

Erosion of the soil resource does not stop at the farm fenceline. Students, as people who use Alberta's resources and who will one day make decisions about them, need to have a better understanding of the physical and man-made forces that contribute to erosion.

Certainly, soil erosion of farmland is a great loss to the farmers immediately, but indirectly and eventually, it is also a great loss to all citizens.

PROCEDURE

Part 1 Introduction	1.	Class defines "erosion"; focus on physical erosion. Ask for examples students have seen (e.g., in river valleys, on construction sites, ice in the street, farmers' fields).
	2.	What are the "agents" of erosion? What things cause a material to erode away? Which of these agents are present in Alberta?
	3.	Focus discussion on erosion of the soil by water. What famous or historical examples of soil erosion can you name?
Part 2 Activity	4.	Local examples of erosion (small scale to large scale). For one week, students will look for and record examples of erosion using "erosion log" (copy and sample attached). Any photos or news clippings could be displayed on the bulletin board.
Part 3 Conclusion	5.	Review logs in one week. Summarize student findings. (Some of these locations could be included in a field trip.)
	6.	The experiment on erosion (following the Related Activities) can also be done.

DISCUSSION QUESTIONS

1. What results would you expect if a rain shower over a freshly cultivated field was accompanied by golf ball size hail stones? (effects on soil, soil cover, nearby streams and ditches)
2. Erosion is a great challenge for farmers. What techniques can today's farmers use to prevent or reduce soil erosion? (e.g., reduce tillage, strip farming, leave stubble in the fields, plant windbreaks of trees, work the land along the contours, put soil that is highly erodible back into cover)
3. What other industries besides agriculture have serious problems with soil erosion? (forestry, construction, oil/gas exploration, fisheries, some recreational industries)
4. Why is soil run-off into streams/canals a problem? (e.g., kills fish and modifies habitat, requires dredging of waterways)

EVALUATION STRATEGIES

1. Student logs.
2. Student summary reports on experiments.
3. Participation, questions asked.

RELATED ACTIVITIES

1. Field trip (by foot or vehicle) to see evidence of erosion and preventative measures.
2. Films/videos from Alberta Agriculture Film Library, 7000 - 113 Street, Edmonton, Alberta T6H 5T6
   - **572** Oh gully - where is the soil?
   - **573-1** Nothing is forever
   - **516-3** The urge to fill
   - **516-2** Zero tillage
3. Guest speakers - District agriculturists, agriculture fieldmen, local farmers. (Conservation 2000 club member?)
4. Contact agriculture colleges or U of A (Soil Science Department) to view research plots on this topic.
5. Additional variations to this experiment could be tested by groups of students (see separate page at end of this activity).

Original lesson idea by Peter Tymkow
Modifications by AITC

Erosion Simulation

1. Fill four 9" x 13" cake tins almost to the brim with the same type and amount of soil.

2. Pan #1. Leave as plain soil.

3. Pan #2. "Plough" crossways across the tin to simulate contour working of the land (the lines will run parallel to the horizon).

4. Pan #3. Stick straw and small sticks into the soil to simulate ground cover.

5. Pan #4. Cover the soil with a piece of sod.

6. Place each cake tin over its own catch basin so that you can collect the run-off for measurement and observation.

7. Using a watering can and the same amount of water for each cake tin, simulate a rain shower. Remember to hold the can the same distance from each tray. In some of the cake tins, the first container of water may not initiate erosion. Use additional water and record the amount.

8. Collect and save run-off from each pan.

9. Students compare the run-off from each pan. How much? Why did this vary? Colour of run-off? Which pan absorbed and held the most water before allowing run-off? Why?

10. Compare the conditions of the soil remaining in the cake tins. What differences do you see? Which pans allowed the most erosion and why? Which prevented erosion?

TEACHER RESOURCE

SHEET ONE --

Water Erosion in Alberta

Water erosion of farmland has received less attention in Alberta than wind erosion because it has not created "black blizzards". Since rainfall in the province is of relatively low intensity and of short duration, the soil readily absorbs most of the rainwater. Thus, soil erosion by water is usually not seen as a major problem in the province.

However, during spring snowmelt and heavy rains, water erosion and flooding can result. Run-off water frequently ends up in low-lying areas where it is not needed, and is often accompanied by a deposit of eroded soil. The Peace River region is one area of the province where erosion is often very noticeable after snowmelt, but central and southern Alberta are also susceptible to water erosion.

As noted by Dr. J.A. Toogood in the report, "The Story of Soil and Water Conservation in Alberta" (Alberta Agriculture Agdex 570-2), there are major problems arising from water erosion:

1. "Topsoil is lost by sheet, rill and gully erosion, and there is a gradual transport of topsoil downslope by splash erosion. These processes along with wind erosion have led to eroded knolls and upper slopes and reduced productivity.
2. Gullies form in fields and roadside ditches. Deep gullies in fields interfere with farm operations, are a source of weeds, and pose a safety hazard.
3. Roadside ditches, drainage channels, sloughs and streams are filled with eroded materials.
4. Irrigation return flow has been allowed to erode large gullies in some cases."

Dr. Toogood gives several examples of management practices that lead to such water erosion problems:

1. "Water courses (through farm yields) are cultivated. The first heavy rain in years comes unexpectedly and washes away soil, creating a gully.
2. Steep slopes are cultivated and cropped. Sheet and rill erosion wash off the topsoil unless there is adequate crop cover. If an unexpected storm strikes in June while the soil is not well protected there can be serious erosion.
3. Fields are summerfallowed when it is not necessary for conservation of moisture ... with no crop residue left on the surface water, erosion can occur with rains of relatively light intensity.
4. Fields are cultivated up and down the slope instead of on the contour. Run-off that might have been trapped on the slopes by contour ridges flows down the man-made furrows and valuable water is lost and soil eroded.

TEACHER RESOURCE

SHEET ONE (cont'd)

5. Some farmers continue to bury all crop residue when tilling their land. This is an open invitation to water erosion and puddling of the soil, with nothing left to impede surface run-off. This is also a major problem on irrigated land because of intensive cultivation to prepare seedbeds, especially on sloping land irrigated with center pivot systems.
6. Allowing water erosion to occur may also cause other problems; silting and pollution of streams and rivers, a problem for provincial hydrologists and civil engineers, and for wildlife officers."

However, these problems can be controlled by taking certain measures:

1. "Water courses likely to form gullies should be seeded down to grass or grass legume mixes.
2. When summerfallowing, as much crop residue as possible should be left on the surface to form a protective cover for the soil.
3. Consider contour tillage if the topography lends itself to this practice. It will reduce run-off and give rain a chance to be absorbed by the soil.
4. Contour strip cropping could be considered where slopes are long and wide.
5. Crop rotations including grasses and legumes not only provide protective cover for the soil but result in an improvement of soil structure and tilth and a chance to build up its organic matter content.
6. Not much can be done in most cases to hold back the spring snowmelt, but a tall stubble will trap snow and retard run-off. Fall cultivation is often unnecessary and should be avoided if possible."

In conclusion, to reduce water erosion, it is necessary to: prevent run-off and conserve soil moisture whenever possible; stop gullying by using grassed-in water courses; and leave sufficient crop residue on the surface to form a protective cover.

Information excerpted from Alberta Agriculture publication

"The Story of Soil and Water Conservation in Alberta"

by Dr. J.A. Toogood, P.Ag.

STUDENT RESOURCE

SHEET ONE --

Erosion Log -- SAMPLE

Name *Pat Jenkins*

Date *September 19* **Specific Location** *Trail #3 Bon Echo Park*

Describe the erosion (e.g., width, depth, soil layers or rock exposed, trees uprooted, etc.) *gullies created in the trail up to 30 cm deep and 40 cm wide; rock exposed at some spots; trees slumping into trail; washed out gravel at base of hills*

What was causing or contributing to the erosion?
dirt bike use; horses being ridden by park users; heavy rain storms this year; park maintenance reduced due to reduced budgets; increased number of park users

Are people or animals contributing to this erosion in some way? Explain.
all of above except rain storms

How severe was the erosion? slight _____ moderate _____ severe *x*

What problems, if any, are being caused by this erosion now? *difficult and dangerous to use some parts of trail*

If this erosion continues, what problems could develop in the future? *very expensive to repair; injuries to users or park staff; closing of trail to everyone*

Your recommendations: *immediate repair; limit traffic to pedestrians only; direct other users to more appropriate trails*

Teacher comments:
Pat - a thorough report! Suggest additional cause - removal of original cover. Recommend - some effort to educate the park users as to the effect their actions have on the park. We'll include this location in my slide collection and hopefully a field trip! Thanks.

Mrs. Zurkowski
September 25

STUDENT RESOURCE

SHEET TWO --

Erosion Log

Name _____

Date _____ **Specific Location** _____

Describe the erosion (e.g., width, depth, soil layers or rock exposed, trees uprooted, etc.) _____

What was causing or contributing to the erosion?

Are people or animals contributing to this erosion in some way? Explain.

How severe was the erosion? slight _____ moderate _____ severe _____

What problems, if any, are being caused by this erosion now? _____

If this erosion continues, what problems could develop in the future? _____

Your recommendations: _____

Teacher comments:

STUDENT RESOURCE

SHEET THREE --
Variations Which Could be Tested by Small Groups

Object	Change	Expected Results
Impact of slope on erosion	angle of soil pans	increased slope increases erosion
Heavy vs light showers	volume of water and speed of spray	increase in erosion
How do partially frozen soils erode? (spring conditions)	freeze soil pan, then allow to partially thaw in the sun	thawed soil erodes more rapidly with often severe results
Type of soil	compare erosion in pan of sand to pan of heavier soil under similar conditions	lighter soil erodes more quickly

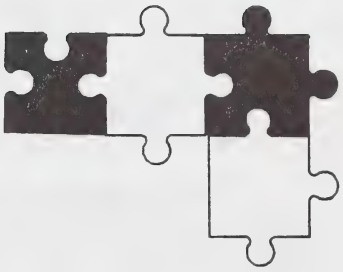
STUDENT RESOURCE

SHEET FOUR --

Evidence of Water Erosion

Activity 15

THE "DOMINO EFFECT" OF SOIL EROSION



STUDY QUESTION: How does soil erosion affect me?

THE ACTIVITY: Students construct a model of cause/effect in relation to soil erosion by the wind.

CURRICULUM FIT:

GRADE EIGHT - SOCIAL STUDIES

- The influence of physical environment on people's way of life.

AGRICULTURE CONCEPTS: Soil conservation.

PURPOSE: To assist students in discovering the links between management of a basic physical resource and their day-to-day lives.

MATERIALS REQUIRED: A collection of dominoes, paper, pencils, tape, historic photos, Alberta Agriculture videotape "Gone with the Wind -- Too" (optional but highly recommended), flat surface on which to line up dominoes, student summary sheet "Effects of Soil Erosion", teacher resource "Wind Erosion in Alberta" (attached).

TIME REQUIRED: Two class periods.

NOTE
This lesson can be used in conjunction with the other soil erosion lessons in this book: "Evidence of Erosion" and "Land Use Issue -- Erosion".

BACKGROUND - For the Teacher

This activity has the potential to "personalize" soil erosion for your students, by having them examine how depletion of a physical resource can have serious impact on the family unit. This activity will cause students to consider the question "Does stewardship of the land matter to my family?". The activity may increase interest and respect for the physical environment.

PROCEDURE

Part 1
Introduction

1. Introduce the topic with the following questions and comments.

   a. What can you tell me about the Dirty Thirties?
   b. What can you imagine farming and farm life was like then?
   c. What caused the Dirty Thirties to happen?
      (the soil erosion aspect, not the entire Depression)
   d. Who has seen a dust storm? Please describe it and your reaction to it.
   e. Could the Dirty Thirties phenomenon happen again? Discuss.

Part 2
Activity

2. "Some people say that soil erosion is just a farmer's problem. What's your reaction to that statement? Today we're going to look at soil erosion by the wind and how it affects everyone."
3. Break class into four groups representing (1) The Land Itself, (2) Farmers and Farm Families, (3) Suppliers to Farmers and (4) Consumers of Agricultural Products. Give each group its instructions (attached) and about 20 domino-sized pieces of paper. Use a different colour of paper for each group. Give each group a page of lined paper.
4. Ask each group to produce a collection of all the effects that soil erosion would have on their group. Write one effect per small piece of paper. Each group will also maintain a master list of effects. Tape the small pieces of paper to the dominoes. Give out the dominoes after they have completed the task.
5. Distribute student summary sheets "Effects of Soil Erosion". Report by the group representing "The Land Itself". The entire class may at this time wish to add extra effects that they have thought of for this group.
   This would be an appropriate time to view the videotape
   "Gone with the Wind -- Too".
6. Reports by groups two, three and four. At the end of each report, encourage the class to add additional effects.

Part 3
Conclusion

7. Review each list of effects. Ask students to identify those effects which would affect them or their families.
8. Line up the dominoes. Blow on the first domino and hopefully they will all fall down in order.

DISCUSSION QUESTIONS

1. Whose business is wind erosion?
2. What weather conditions would contribute to wind erosion?
3. Who is responsible for soil conservation?

EVALUATION STRATEGIES

1. Participation, presentation.

RELATED ACTIVITIES

1. Guest speakers - someone who has experienced the Dirty Thirties - a person who is familiar with wind erosion and soil conservation.
2. Bulletin board display of historic or recent photos of soil erosion.

Resources

The videotape "**Gone with the Wind -- Too**" (order #573 F/Vt) can be borrowed from:
Film Library, Information Services Division, Alberta Agriculture, 7000 - 113 Street, Edmonton, Alberta T6H 5T6

Original lesson idea by Wyatt Carrell
Modifications by AITC

STUDENT RESOURCE

SHEET ONE --

The Effects of Soil Erosion -- The Groups

The Land Itself

Your group represents the land itself. You are to think up as many effects that soil erosion would have on the land as you can. To start with, think of the appearance and its physical properties.

Write all the effects down on the large sheet of paper to report to the rest of the class. Then copy one effect per small piece of paper. These will be taped to dominoes.

Confine your discussions at this time to the effects of erosion on the land only.

Farmers and Farm Families

Your group represents the farmers and farm families. You are to think up all the effects that soil erosion would have on the farmers and farm families. Some of the effects of soil erosion happen immediately; others take place over a period of time.

Write all the effects your group thinks of on the large sheet of paper. Then copy individual effects onto the small pieces of paper. These will be taped to dominoes.

Confine your discussions to the impact of soil erosion on the farmers and their families only at this time. Think of how farmers might decide to react to this problem.

Suppliers to Farmers

Your group represents all the people/industries that supply goods (e.g., fuel) or services (e.g., lawyers, banks) to farms and farm families. Your job is to think of how farmers might react to soil erosion and how this might affect your business. There may be positive as well as negative effects. There may be initially positive effects which later drop off. Be specific in your answers.

Write all your answers on the large sheet. Copy one effect per small piece of paper. These will be taped onto dominoes.

Consumers of Agricultural Products

Your group represents consumers and the community. Think about how soil erosion might affect the land, farmers and their suppliers. What effects will these changes have on you? Write down all the effects you can think of on the large piece of paper. Copy one effect per small piece of paper. These will be taped onto dominoes.

e.g. How would a downturn in the industry of agriculture affect the job market?

STUDENT RESOURCE

SHEET TWO --

The Effects of Soil Erosion

On the Land Itself	On Farmers and Farm Families	On Suppliers to Farmers/Families	On Consumers/Community
☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐
☐	☐	☐	☐

After completing this chart, put a check mark (in the box provided) beside each effect that might impact on your family.

STUDENT RESOURCE

SHEET THREE --

Evidence of Wind Erosion

TEACHER RESOURCE

SHEET ONE --

Wind Erosion in Alberta

Wind erosion is an age-old phenomenon. It has helped to carve the landscape of Alberta over the millenia. But wind erosion of the soil became a major problem after the settlers moved in and put the plough to the land.

The problem was especially acute in southern Alberta by the 1910s when whole fields lost their topsoil, which drifted into ditches and fence-rows. The use of the moldboard plough, the practice of black summer-fallowing (leaving no plant material on the soil surface), stubble burning, and the use of dust mulches to conserve moisture encouraged wind erosion.

In 1921, A.E. Palmer was appointed the assistant superintendent at the Experimental Farm (now the Agriculture Canada Research Station) at Lethbridge, and he devoted his attention to helping farmers control wind erosion. Practices such as strip farming (planting crops in strips instead of leaving a field bare) and maintaining a trash cover (grain stubble, dead weeds, straw and other plant residue) on the soil began to be used with some success.

From 1931 to 1937, very low rainfalls resulted in poor crop yields. Maintaining a trash cover was difficult, and high velocity winds led to "black blizzards" (leading to the name "The Dirty Thirties"). Serious soil drifting occurred even in irrigated areas.

The area known as Palliser's Triangle became a virtual dust bowl. Compounding the problems were low prices for farm commodities and infestations of pests like grasshoppers. Many farms were abandoned, and people often lived at a bare subsistence level.

However, under the Prairie Farm Rehabilitation Act of 1935, research stations were established to help farmers save the soil. This led to procedures for re-establishing grass cover, organization of community pastures, planting of shelterbelts and water conservation measures.

A technological breakthrough was made in 1935 by C.S. Noble, who devised a blade weeder that killed weeds in fallow but still left the stubble standing. The Noble blade, which was modified over the years, became a big seller all over the world.

By the late 1930s, the problem of soil drifting in the chinook belt was under control provided that proper soil conservation methods were practiced. But in some other areas of Alberta, dust clouds continued to be a common sight because farmers did not take the proper precautions.

Larger fields and poor cropping practices led to further wind erosion each year. As recently as 1988, a black blizzard occurred near Edmonton. Alberta has legislation -- in the form of the Soil Conservation Act -- to promote soil conservation and to impose penalties on landholders who allow erosion to occur, but there have been few prosecutions under this Act.

TEACHER RESOURCE

SHEET ONE (cont'd)

There are also farmer groups and private organizations like the Soil and Water Conservation Society that try to spread the word about conservation. As wind erosion is Alberta's most serious erosion problem, the control measures should again be emphasized. These include:

- keeping a cloddy structure at the soil surface by using proper implements such as spring-tooth or chisel cultivators
- protection of the soil from wind by leaving trash cover of straw, stubble, etc. on uncropped lands
- the planting of shelterbelts and barrier strips of tall-growing grasses or annual plants
- strip-cropping, whereby strips of crops alternate with strips of fallow across the direction of the prevailing wind
- seeding highly-erodible soils permanently with grass

The message behind all this is that prevention is the name of the game when it comes to wind erosion. In the last several decades, technology has helped to combat the problem. For example, the risk of wind erosion has been reduced by the development of large machines that can perform field operations quickly and effectively, by chemical control of weeds and by new, more drought-tolerant varieties of grain.

The use of the herbicides to control weeds means that minimum or no tillage is used. The only cultivation needed is to plant the seed. However, the cost of herbicides and the need for specialized seeding equipment has limited the widespread adoption of "zero tillage" systems. There are also the drawbacks/benefits to be considered in the use of chemicals.

It is clear that today's society places a high value on the protection of soil for future generations, but a difficult question remains. Who should pay for soil conservation practices? Should the farmer be expected to bear the entire load of implementing conservation measures or should society at large help in some way?

Information taken from Alberta Agriculture publication

"The Story of Soil and Water Conservation in Alberta"

by Dr. J.A. Toogood, P.Ag.

Activity 16

PUTTING YOUR BEST FOOT (HOOF?) FORWARD!

STUDY QUESTION:

How and why does the agriculture industry promote itself and its products?

THE ACTIVITY:

Students examine and evaluate existing promotional/ educational materials available in Alberta. Students produce a sample kit of their own promotional materials.

CURRICULUM FIT:

DIVISION THREE - LANGUAGE ARTS

- Visual communications possess distinctive elements and structures which may affect meaning.
- The viewer must evaluate the apparent reality created in media products.
- Competence and flexibility in writing are developed through a broad range of writing experiences for a variety of purposes and audiences.

AGRICULTURE CONCEPTS:

Promotion of the industry.

PURPOSE:

To develop evaluation skills.

To provide an opportunity to apply creative energy to an Alberta product.

To become better informed about the industry of agriculture and its career opportunities.

MATERIALS REQUIRED:

Educational packages and materials produced by a variety of agricultural organizations and government; video samples of advertisements aimed at consumers by producer organizations.

TIME REQUIRED:

Two to four class periods.

BACKGROUND - For the Teacher

As consumers, students need to be armed with accurate information and a means of making sense of it. They need to know how to access information on which to base purchasing decisions. And, in a world that is only too willing to "stretch the truth" in order to make a buck, they need to know how to check the facts for themselves.

This activity provides them with a taste of what educational/information packages exist out there and what they are trying to achieve (inform, dispel myths, replace misinformation, entice). It also provides an opportunity for your students to determine what consumers need to know about a product and how to meet that need through the production of similar resources. Students will identify gaps in existing materials and produce resources to help fill the gap.

PROCEDURE

Part 1
Introduction

1. Break the class into small groups of four or five. Provide each small group with a a set of resources from three organizations. Explain to the students that they will be expected to evaluate the content and method of presentation of the information, and identify gaps. They are expected to be constructive in their comments, i.e., offering suggestions for improvement, rather than just playing the complaining critic. Provide the students with an evaluation sheet (sample attached) or a list of questions they should be able to answer about the resources they will be examining.

   Allow the students time to work through the activities in the kits they are examining.

Part 2
Activity

2. Reports from the small groups to the large group. These can be verbal, poster form with commentary, or verbal with a short written report. Students are to retain their evaluation forms for teacher evaluation (optional, but seems to increase the chance of their being completed!).
3. Each group is to identify a product that is not represented or is under-represented in the materials reviewed. They will identify a target audience, specifics of what they want to achieve through their promotion efforts, and examples of what should be in a major promotional project for this product. (Resources they produce might include fact sheets, posters, bumper stickers, television ads, radio jingles or songs, contests that highlight their project or educate the game players, for a few examples.)

   The teacher may want to set criteria for what is included. For example, "The materials are to be 1/3 educational, 1/3 advertising and 1/3 activities and recipes or practical uses of the product."

HINT
The teacher may choose to leave out an interest group or product that is locally represented, in order to build interest in the project. The only concern is that the students might "remake" materials they have already seen used for that product. You could get around this completely by having the students prepare the packages for a totally different group than the original was (different in age, reading level, etc.)

4. Review the materials already studied as examples for the specific tasks of the individual students. Examine resources in the library that may be used for the facts that students wish to relate to the public. Encourage students to communicate with people involved in the sector of agriculture they wish to promote.

5. Check back with the students to ensure that work is progressing.

Part 3
Conclusion

6. Evaluate the finished products, with the students being involved. Revise material according to suggestions from the students. (Set evaluation criteria as a group before starting the projects, so that participants can be guided.)

DISCUSSION QUESTIONS

1. Why do agricultural producers and interest groups need to do promotion? Doesn't everyone know their products are good?
2. What is in competition with Alberta products? (competition with other commodities within the province and with commodities from outside the province)
3. Who is advertising aimed at? Who is educational material aimed at? What type of media are appropriate for people your age? For your grandparents?
4. Can educational/promotional material ever backfire/produce an undesired effect?
5. The reading levels of Canadian residents are going down, yet we still need to be informed. How would you deal with this fact in designing your education package?

EVALUATION STRATEGIES

1. Participation, communication.
2. Quality of samples produced.
3. Number and quality of sources used.
4. A written test on agricultural themes displayed in all the promotional material. (This is more an evaluation of carryover than the students' ability to study.)

RELATED ACTIVITIES

1. Displaying materials in the school.
2. Presenting materials in the school.
3. Reviewing materials with members of the interest groups and asking for feedback from them.
4. Entering materials in the agricultural fair.

RESOURCES

To obtain a list of the organizations which have educational materials available for use by school groups phone Ag in the Classroom at 427-2402 or write to Room 200, 7000 - 113 Street, Edmonton, Alberta T6H 5T6.

Original lesson idea by Bob Johncox
Modifications by AITC

STUDENT RESOURCE

SHEET ONE --

Evaluation Form

Material being evaluated _____

_____

This material appears to be aimed at the following age group(s):

6-10 ☐ 11-14 ☐ 15-18 ☐ 19-25 ☐ 25-40 ☐ 41-65 ☐ 65+ ☐

Check all that apply.

Types of material (e.g., pamphlets, games, audio tape) _____

_____

Considering the age group it is aimed at, I think the reading/listening level is:

too easy ☐ just right ☐ too difficult ☐

The package is: unattractive ☐ attractive ☐ very attractive ☐

The contents of the package are:

boring ☐ interesting ☐ I couldn't put it down!!! ☐

The activities (if any) helped me better understand about this interest group and/or its product.

yes ☐ no ☐

After reviewing this material, I feel:

less positive ☐ the same ☐ more positive ☐

about the organization and/or its products

Two improvements I can suggest are:

(1) _____

(2) _____

Person completing this evaluation _____ Date _____

(optional)

Activity 17

GREENHOUSING IN ALBERTA

STUDY QUESTION:

How do greenhouses operate? What special knowledge and procedures are required?

THE ACTIVITY:

Students build a small greenhouse and experiment by growing plants in a specialized environment.

CURRICULUM FIT:

GRADE SEVEN - SCIENCE

- Topic 1: Characteristics of Living Things - identify and describe characteristics of living things: in particular their ability to grow and reproduce (i.e., photosynthesis and plant propagation).

GRADE EIGHT - SCIENCE

- Topic 5: Growing Plants.

GRADE EIGHT - AGRICULTURE

- Theme 2: Technology and Research - artificial environments, optimum conditions for plant growth.

AGRICULTURE CONCEPTS:

Plant propagation; monitoring plant growth; controlling plant growth environments; specialized technologies for plant production.

PURPOSE:

To help students derive first hand experience with the intricacies of growing plants under controlled conditions.

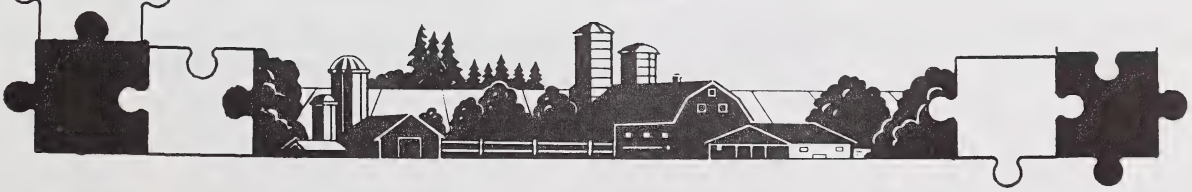
To introduce students to a novel career opportunity.

MATERIALS REQUIRED:

Incandescent light bulbs and fixtures, fluorescent lights and fixtures, containers to hold the growth media, large table, .06 ml plastic sheeting, fan, electric heater, seeds (flower/vegetable), fertilizer, water hose, misting device and source of water, shovel or trowel, two by fours, thermometer (see Appendix 1 for instruction on greenhouse construction), information and labs on plant propagation (see Appendix 2).

TIME REQUIRED:

Construction, initial instruction, seeding - 6 periods. Supervision and maintenance of program, field trip - 12 periods. (Spread over approximately 12 weeks.)



BACKGROUND - For the Teacher

Greenhouse gardening has been an integral component of agricultural practices around the world for centuries. It has been used by amateurs as well as by professional growers of plants. The ability to maintain or initiate growth outside of natural growth periods and habitats has contributed to the survival and continued appreciation of many plant specimens.

Early Romans used "muscovy glass" (mica) to protect the growth of herbs and other plants used in their medical preparations. Greenhouses were reported in France in 1385, but their prior operation is almost certain.

The construction materials available, among other things, determine the effectiveness of the operation of greenhouses. Demand for crops which could not normally be grown out of season was a major incentive for innovative farmers. Also, as explorers brought exotic plants back to Europe, the rich and powerful demanded the propagation of these beautiful and useful, but tropical plants. Technology was developed to produce these crops.

In the early years of greenhouse operation tropical plants were generally kept in wooden tubs. In summer, they were moved outside while in winter, plants were moved inside the glass-covered structure. Heat from a wood burning stove maintained the temperatures required. Use of a lean-to helped guard against early frost which might have killed blossoms on local vines and trees. It was soon learned that a protective covering was an aid to many plants in addition to those for which the technology was intended.

The first greenhouse in North America was constructed by Benjamin Franklin. In Canada, greenhouse operations appear to have been started formally by a company called Lord and Durham in 1854. More recently, the centre of the greenhouse industry in Alberta is in the Medicine Hat/Redcliff area. Today, greenhouses dedicated to vegetable and ornamental plant propagation operate over the full length of the province. There are currently about 300 commercial greenhouses in Alberta, employing 1200 full time people and generating a gross revenue of over $40 million per year. Reports of greenhouse operation in the Arctic demonstrate the utility of this form of agriculture.

Greenhouse construction is based on much research. Styles include gable roof, A-Frame, Quonset, Slant-Leg and the Gothic Arch. When choosing a style, the farmer must consider not only costs, but also the greenhouse's purpose and location.

PROCEDURE

Part 1

Introduction

1. Work with the students to identify the factors affecting plant growth. List them on the chalk board: have the students write the list in their notebooks. At this time, you may wish to do the plant propagation labs and tests contained in Appendix 2 of this lesson.
2. Divide students into groups of four. Have them generate a list of plants they are familiar with that do not naturally grow in this climate, or which need a head start.
3. After the concept of "native and common" is familiar due to the student's study, students will choose the plants which they wish to propagate.
4. Students, assisted by teacher and parents if available, will construct a temporary greenhouse using plastic draped over lumber (2 x 4's if possible). A sample is shown in Appendix 1.
5. Place a large table in the tent. Secure your light fixtures over the table. Consult Division maintenance staff regarding meeting all safety requirements before starting this project! Consult literature to determine the combination of incandescent and fluorescent lights required.
6. Secure the ventilation fan at one end of the greenhouse to circulate air over the new plant growth.
7. Temperature may be raised with a small thermostatically controlled heater.
8. Soilless mixes may be used. These can be purchased premixed or you can mix your own.

8. Soilless mixes may be used. These can be purchased premixed or you can mix your own.

    Peat (sphagnum) 0.49m^3
    Horticultural vermiculite 0.49m^3
    Dolomite Limestone 5.90 kg
    Superphosphate 0-20-0 1.20 kg
    Potassium Nitrate 13-4-44 0.90 kg
    Chelated Iron 37 g
    Borax (Sodium Borate) 37 g
    Fritted Trace Elements 110 g

    Other mix suggestions may be obtained from commercial sources or from your district agriculturist.

9. If using soil, choose sandy loam with a high organic matter. Vermiculite and other media may be incorporated in varying amounts. Keep notes on the combinations. Test the various mixes for water retention and record this too, since it may impact on the growth results.

    To pasteurize soil

    a. Place 7 to 10 cm of soil into a cake pan and moisten thoroughly (don't soak).
    b. Cover with aluminum foil, insert a meat thermometer into the centre of the soil and place in the oven.
    c. Set the oven at 93° C (200° F). Make sure the temperature of the soil does not exceed 82° C (180° F) or beneficial bacteria will be killed.
    d. Remove from the oven and allow to cool. Keep this pasteurized soil separate from untreated soil.

10. Use commercial containers or those provided by students. Drainage and cleanliness are very important.
11. Water should be as pure as possible. Application by misting may reduce compaction of the growth medium.
12. A sealed environment has its problems with disease and pests. Infestations, once introduced, can spread quickly in this improved climate. Consult specialists regarding prevention and treatment of these problems. Some treatments involving chemical use might not be allowed on school property, so try to avoid needing to consider them!
13. Students should keep records of their projects, with dates, materials used, watering, growth, problems and also daily temperature extremes (available from the local paper). A sample log is attached.

Part 2

Activity

14. Arrange a trip to a local greenhouse. This should be conducted prior to the construction of the classroom greenhouse. Ask the greenhouse operator what

Field Trip

procedures he uses to avoid contamination of his operation and follow them (e.g., if touring one greenhouse after another, do not carry plant material from the first into the second). Have the students prepare their questions for the operator before they get on site. Ask the operator if it would be possible for the students to participate in a "hands-on" activity while on the visit.

Maintenance

15. Students must be scheduled to make daily observations of the operation. Individuals or groups must keep notes on a regular basis. The group should establish a standard way of making notes (terms to use, how measurements are to be done, etc.).
16. A schedule or routine must be established for watering and other monitoring over the period which could possibly stretch to 90 days. Avoid overwatering--it kills more plants than neglect!

17. Any students with personal experiments relating to water, temperature, light, etc. will be responsible for their own experiment. Their experiments should be boldly labelled so that no kind-hearted soul waters something that should not be watered!

Part 3
Conclusion

18. The culmination of the unit will be at the discretion of the class. Selection of plant species with short growing periods will shorten the experiments, obviously, and could possibly reduce the opportunity for problems.

DISCUSSION QUESTIONS

1. Aside from initial construction costs, what are the major input costs of greenhouse operations in Alberta?
2. What factors would affect a greenhouse operator's decision as to what crops to grow next year in his/her operation?
3. What personality traits would be helpful for greenhouse operators and workers?
4. Some greenhouse operators sell directly to the public. What are "peak times" for them?
5. If you were hiring a person to work in your greenhouse, what skills would you require them to bring with them? What skills would be taught on the job?
6. In larger greenhouse operations, the work is divided according to skills and knowledge (e.g. book-keeping, service to customers, transportation, plant care, building maintenance). Where might a person like you fit into a greenhouse operation?
7. If a person were curious about the greenhouse business, how would he/she find out more? If you really wanted to get serious about this, what studies would be recommended?

EVALUATION STRATEGIES

1. Participation, journal/record of operations, project results, written test.

RELATED ACTIVITIES

1. Horticultural show.
2. Tours at open house or parent/teacher interview time.
3. Plant sale (not necessarily of those plants grown by the students).
4. The planting of bedding plants in the school year or some community spot (perhaps a senior's residence).
5. Trip to Muttart Conservatory in Edmonton or Devonian Gardens in Calgary.
6. Reclaiming high traffic areas in your school yard.

APPENDICES TO LESSON

1. Greenhouse Structure.
2. Teacher lecture notes, sample lab experiments, sample tests and test answers.

ADDITIONAL RESOURCES

Hobby Greenhouses in Alberta, Agdex 731-5
Sanitation and Disease Control Recommendations for Greenhouses, Agdex FS200/15-1
Greenhouse Production in Alberta, Agdex 000-19

Order by writing on school letterhead to Print Media Branch, Alberta Agriculture, 7000 - 113 Street, Edmonton, Alberta T6H 5T6.

Original lesson idea and material by Tom Zieffle
Modifications by AITC

STUDENT RESOURCE

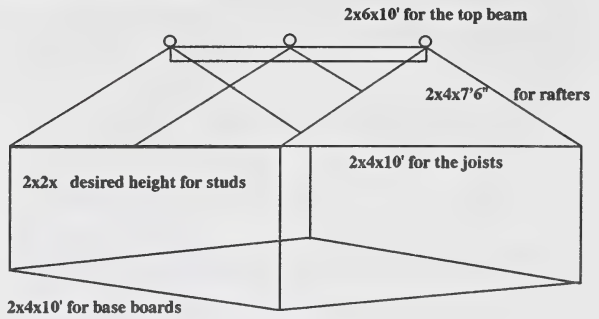
SHEET ONE --
Greenhouse Log Book

Date	Person	Action Taken	Observations and Comments

Greenhouse Structure

Constructing the frame for the controlled environment depends on the space available. Size can range from 1 m2 to 10 m2. Size and space will determine the style as well as the kinds of materials used.

Large Scale - Suspended Roof



Directions:

1. Assemble rafter structures. Connect with the top beam to form the roof.
2. Measure plastic for coverage including sufficient to wrap around base boards. Centre the plastic, cover the rafters and affix to the roof. With the hanging system you have devised, suspend the rafter structure to the desired height. **BE SAFE! GET HELP IF NEEDED!**
3. Lay out baseboards beneath the suspended roof system and affix to form the square bottom. With assistance, affix the studs to the baseboard and the roof structure. Keep the roof level. On the sides, staple the plastic to the studs and base boards.
4. Move grow-tables inside the greenhouse.
5. With assistance, hang the electrical fixtures above the grow-tables.
6. Cut plastic to cover one end solidly. Fit the door end so that it can be closed. Ventilation considerations must be made. **Think and measure twice; cut once! BE CAREFUL! HAVE FUN! Inspect frequently.**

LAB for Grade 7/8 Science/Agriculture

as written by Tom Zieffle

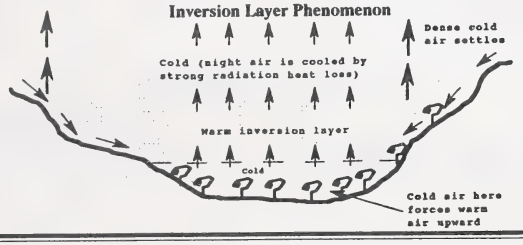
Period (s): _____
Date: _____

LESSON OBJECTIVE: Preparation for Planting - Methodology

ACTIVITIES: Plant propagation: Lab 1-Theory; Lab 2-Seed Germination

BACKGROUND:

1. Plants need to be selected. This is due to the fact that plants have adapted to specialized environmental conditions. These conditions include heat, light, water, air, salinity, pH, nutrients and soil structure.
   a. **heat**
      Climate. Climate can be categorized as:
      A - Tropical Rainy; Landscape will be tropical rain forest, monsoon rain forest, or tropical savannah.
      B - Dry Climates; Landscape will be desert, or steppe (typical of grasslands in southeastern Alberta and Saskatchewan).
      C - Humid, mild winter temperatures; Landscape will be dry summer tropical (typical of southern California, Mediterranean, Spain, South Africa and Southern Australia), humid sub-tropical (typical of Asia), or marine west coast (typical of the west coasts of all continents).
      D - Humid, severe winter (Continental); landscape will be continental, cool summer, Taiga (boreal forest), and/or northern grasslands (typical of Canada, northern Central United States and the Soviet Union), or continental warm summer, temperature typical of northern grasslands (except for a much longer growing season).
      E - Polar; landscape will be boreal tundra (soil few centimetres deep, cushion type flowering herbs or low distorted woody shrubs).
      Radiation.
      Intensity and duration are main factors. The more vertical the rays (as in over the equator) the less atmosphere they have to penetrate.
      Landform.
      Valley sites become colder because cold air is heavier than warm air. Inversions are caused.


Inversion Layer Phenomenon
Dense cold air settles
Cold (night air is cooled by strong radiation heat loss)
Warm inversion layer
Cold
Cold air here forces warm air upward

   b. **light**
      - provides energy for synthesis of carbohydrates (sugars).
      - has profound effect on germination, flowering, maturation and dormancy.
      - normal plant growth requires the entire range of the visible spectrum or white light (use prism to determine).
        Processes include **photosynthesis, photoropism** and **photoperiodism.**
        Photosynthesis - highly complex process whereby carbon dioxide and water are transformed into carbohydrates and oxygen.
        Phototropism - is the effect of light on the directional growth of plants.
        Photoperiodism - is the response by an organism to changes of light and dark. In the case of plants, it stimulates flowering.
      - the sun's energy travels across space in the form of electromagnetic waves which are transformed into heat. We experience it as **radiant** heat. This means it heats only the earthly material with which it makes contact. Therefore, heat must travel beyond the surface using a different method called conduction. **Conduction** means that heat passes from one particle to another by warming it. The flow of heat is warm to cold.
      - most of the sun's energy **does not** reach the surface of the earth due to filters. The **ozone** layer acts as nature's most effective filter. **Water vapour** also acts as a filter.
   c. **water**
      The value of moisture to horticulture crops is clearly demonstrated when farmers (using irrigation) or gardeners water their crops. Moisture requirements of plants at each stage of growth have been documented.

Stage of Crop Development (i.e., corn)	Stage	Yield Reduction Due to Stress (%)
Emergence to establishment	1	3
Establishment to rapid growth	2	25
Rapid growth to flowering	3	50
Flowering to dough stage	4	21
Dough stage to maturity	5	1

   d. **air**
      Air must be allowed to flow across the plants. In a greenhouse, fans must blow to mix and stir the air. This is to provide resources the plants need such as carbon dioxide. The temperature of the air affects leaf temperature and growth processes such as photosynthesis, transpiration and respiration. Low temperatures slow the rate of respiration very quickly. Exposure of a house plant to frigid air can create instant freezing.
   e. **salinity**
      Salinity refers to the salt content in the soil. There is no treatment for salt except soil management. The presence of dissolved salts in the soil can be measured by passing electricity through it. The amount of conductivity is a measure of the salt in the soil.

f. pH: requires laboratory testing

pH refers to the relative concentrations of hydrogen ions (H+) and hydroxyl ions (OH-) in the soil solution (this is for information only and not to memorize). These concentrations are expressed in terms of a pH scale which indicates the activity acidity.

The pH scale ranges from 0 to 14. Soil considered acidic (i.e., surplus of hydrogen ions) is below 7 while a reading above 7 is considered basic or alkaline (i.e., a surplus of hydroxyl ions). Each pH unit reflects a ten-fold increase or decrease in relative alkalinity or acidity. Therefore, a pH of 4.0 is ten times more acidic than a pH of 6.0.

Acid soils are referred to as 'sour' whereas alkaline soils are called 'sweet'. Most plants favour soil in the neutral range (i.e., 6.5 - 7.5). You must keep in mind, however, that different plants like different pH levels.

Optimum Soil Acidity for Growth of Some Plants

Optimum pH range	Plants
Very acid (pH 4.0 - 5.0)	Azalea, rhodendron, cranberry and blueberry
Moderately acid (pH 5.0 - 6.0)	Snap bean, potato, watermelon, aster, lily-of-the-valley, orchid, holly, juniper, lily and phlox hydrangea
Slightly acid (pH 6.0 - 6.8)	Asparagus, spinach, beet, celery, cantaloupe, lettuce, onion, rose, chrysanthemum, sweet pea and snap dragon
Slightly and moderately acid (pH 5.0 - 6.8)	Apple, pear, plum, pecan, grape, raspberry, blackberry, strawberry, cabbage, radish, squash, tomato, pepper, sweet corn, carrot and carnation

g. nutrients

All living organisms must obtain a balanced diet of nutrients. Although 16 elements are considered essential, carbon (C), hydrogen (H) and oxygen (O) account for 90 - 95 per cent of the plant's body weight. These come from the air. The remaining 13 of the elements must come from the soil.

Nutrients Obtained From the Soil

Chemical Name	Symbol	Plant Requirements
Major Nutrients		
Nitrogen	N	Relatively large amounts required — Frequently deficient
Phosphorus	P	
Potassium	K	
Calcium	Ca	Relatively large amounts required — Seldom deficient
Magnesium	Mg	
Sulphur	S	
Minor Nutrients		
Boron	Bo	Very small amounts required — Seldom deficient
Chlorine	Cl	
Copper	Cu	
Iron	Fe	
Manganese	Mn	
Molybdenum	Mo	
Zinc	Zn	

h. soil structure

Soil components: **organic matter, mineral matter, soil water** and **soil air.**

Organic matter is material from dead plants and animals which have decomposed through microbial action. The end product of this decomposition is called humus. It is dark-coloured, odorless, uniform, and a relatively stable product that has a high capacity to store the nutrients and moisture required for plant growth.

Mineral matter generally is composed of sand, silt and clay. The mineral component of loam soil usually is about 45 per cent of the soil volume. On a weight basis, however, it accounts for approximately 90 per cent of mass. The composition of the mineral component directly affects the water-carrying capacity of the soil; a kilogram of clay will hold about 50 times as much water as a kilogram of fine sand.

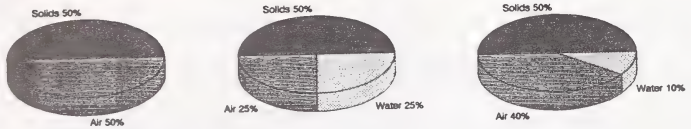
Soil water comes from two sources: precipitation and irrigation. Soil solids compose approximately 50 per cent of soil volume. The remainder of the soil volume is composed of pore space. The size of the pore space directly influences the ability to retain water. The smaller the pore, the greater amount of water it can hold. Conversely, the greater the pore size, the lower the water-holding capacity, and the greater the volume of air. For a loam soil under ideal growing conditions, one-half of the void or pore-space is filled with water and an equal amount (25 per cent) of the total soil volume is filled with soil air.

Moisture Capacity of Several Typical Soils and Peat-Moss

Soil Texture	Water-Holding Capacity (%)
Sandy Loam	12 - 18
Silt Loam	24 - 32
Clay Loam	32 - 48
Peat	100+

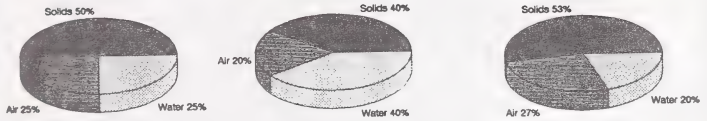
Soil air fills the portion of soil pores not occupied with soil water. During growth, plant roots require oxygen and give off carbon dioxide. Therefore, the composition of air below ground reflects less oxygen below ground than at surface level. An adequate supply of oxygen in the soil is essential for plant roots to function properly. A productive soil is a well aerated or ventilated soil in which there is a good exchange from the atmosphere with air from the soil.

Relative Soil Components at Three Moisture Contents



Saturated **Field Capacity** **Wilting Point**

Relative Volumes of Solids, Water and Air at Field Capacity as Influenced by Soil Texture



Loamy Soil **Clayey Soil** **Sandy Soil**

2. **Methods of Propagation**

The class will explore four methods of plant propagation: **germination of seeds, tubers, runners** and **cuttings.**

Germination is the growth of a plant from a seed. Conditions for successful germination include:

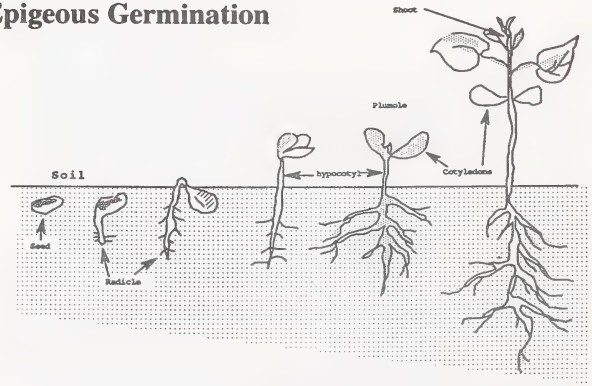
- the absence of any inhibiting circumstances which may prevent the seed from germinating at the appropriate time of the year (fall)
- the presence of air
- a suitable temperature
- the presence of water.

The seed begins germination by absorbing water through the seed coat. Seeds may be **viable** or **nonviable**. [Viable means that the seed, all conditions being positive, is healthy and can develop into a healthy plant.] Nonviable seeds can take up a large amount of water.

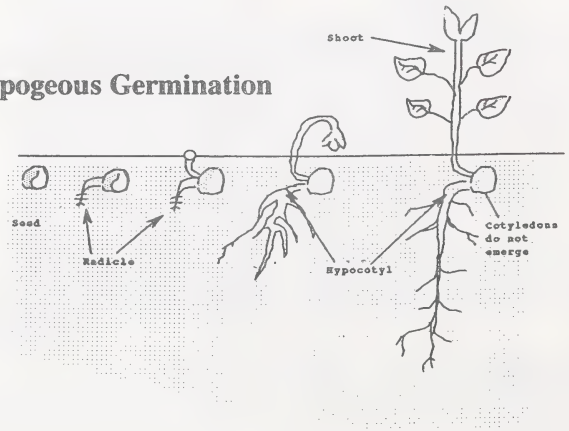
Once the seed coat has broken, active growth is initiated. Further division and development continues and the embryo starts to develop. The onset of this process becomes obvious when the first sign of a root (called the **radicle**) shows. Soon the **plumule** follows. This is the first shoot or stem of the plant.

Two forms of germination occur. They are **epigeous** germination and **hypogeous** germination.

Epigeous Germination



Hypogeous Germination



LAB ACTIVITIES
PART A

Name _____ Date due _____ Mark _____
153

Complete the following:

(8) 1. List the conditions which affect plant growth.

_____ _____
_____ _____
_____ _____
_____ _____

(15) 2. Several factors affect the 'heat' condition. Briefly, describe each factor and indicate what impact each has on the selection of plants for the Peace Country environment. (Teachers can modify this section based on their own geographical region.)

(5) 3. Explain what an 'inversion' is.

(1) 4. Do inversions occur in this part of the world? _____

(6) 5. If inversions occur, what precautions might a gardener take to prevent potential damage?

(15) 6. In your own words, explain the following terms.

Photosynthesis: _____

Phototropism: _____

Photoperiodism: _____

(2) 7. What does the word 'photo' as used in the terms above mean?

(3) 8. The sun generates a tremendous amount of energy. How do we experience heat from the sun?

(1) 9. We call this type of energy distribution _____ heat.

(5) 10. Explain how the sub-surface soil becomes warm enough to support plant growth.

(6) 11. What prevents the surface of the earth from becoming scorched and uninhabitable as are the planets Mercury and Venus?

(10) 12. Respond fully to the following comment. *"The timing, frequency and volume of water that plants receive does not impact on the growth of the plants."*

(6) 13. There are several reasons air flow must be provided for plants. List, and briefly explain two.

(25) 14. Salinity is the amount of salt in the soil. In high concentrations, it can be a very serious problem for farmers. Salinization results when water, carrying dissolved salts, evaporates at the soil surface, leaving the soluble salts at or near the surface. Using reference material from the Vertical File and any other resources (including the district agriculturist, your parents or other knowledgeable persons) explain what happens when salt levels become too concentrated. Secondly, describe a management plan to recover land which has too high a salinity level. (Ensure you make clear how you know what the concentration is in the soil.)

(3) 15. Explain why it is important to know the pH of the soil you use in your garden.

(1) 16. The ideal pH range for bedding plants and vegetables is _____.

(3) 17. Plant nutrition is very important for any farmer or gardener. What three nutrients must be provided if required? _____ _____ _____

(12) 18. Soil structure includes four components. List each component.

(1) 19. The local soil type, based on the figures in Appendix 2 -- LP - Plant Propagation - 2-5, is _____ (you may consult your parents or other knowledgeable person).

(25) 20. Briefly describe the soil management practices which are recommended for this type of soil (you may consult your parents, district agriculturist, or other knowledgeable person). Include in your answer factors such as water, nutrients, organic matter and so on.

LAB ACTIVITIES
PART B - PRACTICAL

Name _____ **Date due** _____ **Mark** _____

200

1. You are to conduct two experiments. Each experiment must be performed and recorded using the scientific method (consult the Science teacher for explicit directions as they must be similar to those used for the Science Fair).

(100) 2. You will conduct two experiments: A and B

Materials
Approximately 25 each of three kinds of seeds, six glass bottles, absorbent material (paper towel), some form of packing, table salt and water.

Experiment A - Moisture

Using three glass bottles, absorbent material (paper towel), some form of packing and water, place several of each seed type in each bottle. Germinate the seeds.

a. **normal** (optimum growth conditions as per the directions on the seed packet).
b. **dry** (water must be available for germination but less than recommended by the directions on the packet).
c. **saturated** (water must surround the seeds).

Experiment B - Salinity

Using three glass bottles, absorbent material (paper towel), some form of packing, table salt and water, place several of each seed type in each bottle. Germinate the seeds.

a. **normal** (optimum growth conditions as per the directions on the seed packet and the normal volume of water).
b. **moderately over-salted** (add one teaspoon [5 ml] of salt to the bottom of the bottle before adding normal volume of water).
c. **excessive over-salting** (add four teaspoons [20 ml] of salt to the bottom of the bottle before adding normal volume of water).

(100) 3. Using daily observation, record the germination and growth of each seed type under each condition. Comment on the apparent effect on root and shoot development. Additionally, determine whether each seed type is a hypogeous or epigeous type of germination.

LAB ACTIVITIES
PART A - KEY

Name _____ **Date due** _____ **Mark** _____

153

Complete the following:

(8) 1. List the conditions which affect plant growth.

heat *light*
water *air*
salinity *pH*
nutrients *soil structure*

(15) 2. Several factors affect the 'heat' condition. Briefly, describe each factor and indicate what impact each has on the selection of plants for the Peace Country environment.

Our climate radically affects selection of plants in this area. Due to the continental (humid, severe winter) conditions, plants must have short growth periods and be hardy so as to survive potential early and late frosts.

The northern latitude limits the heat due to the slant of the rays of energy reaching the earth surface. As the slant increases from September to March, the possibility of deflection also increases resulting in less retained heat. Plants respond to the increased length of daylight in the summer (almost overhead) in a positive manner. House plants should be turned 1/4 turn each day as a result of phototropism.

The landform determines the consistency of heat on the surface. Hills are not subjected to the effect of the inversion phenomenon. Valleys can be seriously impacted when early or late summer cold fronts slide into and ruin uncovered crops leaving hillsides and higher ground relatively untouched.

(5) 3. Explain what an 'inversion' is.

An inversion occurs when the surface air is cooled by radiation heat loss. The cold air, which is heavier, settles and slides into low ground forcing the warm air into a distinct layer above the developing cold layer. The resulting masses of air require vigorous turbulence to reestablish warm air into the low areas.

The sustained lower temperatures may have a detrimental effect on plant growth or survivability.

(1) 4. Do inversions occur in this part of the world? *Yes*

(6) 5. If inversions occur, what precautions might a gardener take to prevent potential damage?

A gardener may do a number of things:
- *choose a garden location not likely to be subject to inversion activity*
- *select plants known to resist the effect of occasional inversion*
- *at critical periods, a gardener may use smudge pots (if legal), fine mists of water or cover the plants with some form of protection (fabric, straw and so on).*

(15) 6. In your own words, explain the following terms.

Photosynthesis: *is the complex process a plant uses to convert carbon dioxide and water into carbohydrates and oxygen.*
Phototropism: *is the effect of light on the direction of plant growth.*
Photoperiodism: *is the response of plants to light and dark.*

(2) 7. What does the word 'photo' as used in the terms above mean?

'Photo' is the Latin word for 'light'. It is connected to other words to suggest the response or effect of light on an organism.

(3) 8. The sun generates a tremendous amount of energy. How do we experience heat from the sun?

The sun's energy travels across space in the form of electromagnetic waves which are transformed into heat. We experience it as radiant heat. This means it heats only the earthly material with which it makes contact.

(1) 9. We call this type of energy distribution ***radiant*** heat.

(5) 10. Explain how the sub-surface soil becomes warm enough to support plant growth.

Heat must travel beyond the surface of the earth using a different method called conduction. ***Conduction*** *means that heat passes from one particle to another by warming it. The flow of heat is from warm to cold.*

(6) 11. What prevents the surface of the earth from becoming scorched and uninhabitable as are the planets Mercury and Venus?

The majority of the sun's energy does not reach the surface of the earth due to the filters of the atmosphere. They include the most important, the ozone layer, and the less effective, the water vapour in the air.

(10) 12. Respond fully to the following comment. "The timing, frequency and volume of water that plants receive does not impact on the growth of the plants."

The statement is entirely incorrect. Firstly, water is essential for germination. Less impact is noted in the period from emergence to establishment probably because enough water is absorbed during the germination process to support growth to basic establishment. During the stage from establishment to the rapid growth and the flowering stage, lack of water can have a devastating effect on the viability and productivity of the plant. Seed yield can be reduced by up to 50 per cent during these two periods. The final stage to maturity is the least affected by lack of water.

As one can see above, timing is critical to seed production. Volume of water at each stage is also a matter of importance. An adequate volume of water distributed at the wrong time can negatively affect the survivability of the plants. Also, inadequate volume of water may prevent appropriate root development which, in turn, may limit the plant's ability to gather the nutrients necessary to enable flower and seed development. Clearly, plants require appropriate amounts of water delivered at the right time for maximum plant development.

(6) 13. There are several reasons air flow must be provided for plants. List, and briefly explain two.

Air flow mixes the air surrounding the plant so that adequate amounts of carbon dioxide can reach the plant, allowing photosynthesis to occur.

Air flow mixes the air so that cold air cannot result in lowered respiration or actual freezing of the plant tissue.

(25) 14. Salinity is the amount of salt in the soil. In high concentrations, it can be a very serious problem for farmers. Salinization results when water, carrying dissolved salts, evaporates at the soil surface, leaving the soluble salts at or near the surface. Using reference material from the Vertical File and any other resources (including the district agriculturist, your parents or other knowledgeable persons) explain what happened when salt levels became too concentrated. Secondly, describe a management plan to recover land which has too high a salinity level. [Ensure you make clear how you know what the concentration in the soil is.]

Salinity of the soil is determined using labatory tests (analyses). The conductivity of electricity through the soil improves with the increased concentration of salt. There is no treatment for salinity except soil management.

The effect of salinity, the upward movement of salt in the soil (often referred to as 'alkali'), impairs plant growth relative to the tolerance of the plant to salt concentrations. As the level gets higher, fewer plants can grow until at some point nothing will tolerate the salt.

Management plans include preventative activity as well as corrective activity. In terms of preventative management irrigation farmers and horticulturists must ensure that high-salt content waters (soft water with high concentrations of sodium and magnesium) are not used for irrigation or

watering purposes. Improve drainage by using ditches and/or installing sub-surface drainage material. Encourage downward flow of soil water to enable surface salts to drain below the surface. Finally, increased organic matter can dilute salt content.

Prevention of this problem is much less costly and difficult than corrective activity. When salinity is too great and the situation permits (smaller land areas), the top soil must be removed and/or replaced with healthy soil. Raised beds also can remove the active growing medium from the salt-laden surface. Other practices can include planting salt-tolerant plants (normally deep-root plants such as clover). Another method which may be tried is to water the plot and flush the salt into a run-off.

In the Peace country where water run-off is a problem due to the flat terrain, some landscaping may be required with drainage ditches running across fields into the nearest water shed area. Naturally, if the land is level, drainage must be coped with as best as possible, and other strategies (such as crop selection) must be considered.

The advice of a soil specialist is warranted when conditions are complex and technically difficult.

(3) 15. Explain why it is important to know the pH of the soil you use in your garden.

Poor growth is often the result of improper pH levels for the plants being cultivated. pH (the relative level of alkalinity - acidity of the soil) can be tested at a laboratory.

(1) 16. The ideal pH range for bedding plants and vegetables is *6.5 - 7.5*.

(3) 17. Plant nutrition is very important for any farmer or gardener. What three nutrients must be provided if required? ***Nitrogen, phosphorus and potassium.***

(12) 18. Soil structure includes four components. List each component.

Organic matter *is the decomposed material from dead plants and animals. It is called humus.*

Mineral matter *is generally composed of sand, silt and clay. While it is less than 45 per cent of volume, it generally is approximately 90 per cent of weight. This component directly affects the water-carrying capacity of the soil.*

Soil water*, originating from precipitation and irrigation, occupies the pore spaces between mineral matter and organic matter. The composition of the mineral matter and organic matter determines the capacity to hold water.*

Soil air *fills the pore spaces not occupied by soil water. A good soil is well aerated and has an adequate supply of oxygen for root growth.*

(1) 19. The local soil type, based on the figures in Appendix 2 -- LP - Plant Propagation -2-5, is ***clayey.*** (You may consult your parents or other knowledgeable person.)

(2$) 20. Briefly describe the soil management practices which are recommended for this type of soil (you may consult your parents, district agriculturist, or other knowledgeable person). Include in your answer factors such as water, nutrients, organic matter and so on.

Soil management relates "to using the soil to the best advantage". Understanding how and when to work the soil to achieve the best soil tilth for crop emergence and development is very critical, as is knowing technology, proper use of fertilizers and soil amendments to improve the chemical and/or physical aspects of the soil." (U of A Home Gardening Course, p 115)

Improvement may involve adding or incorporating organic matter (straw, stubble or manure) into the soil. Recent studies at the Agriculture Canada Research Station in Lethbridge, Alberta, dramatically demonstrated the potent effect of manure as a soil re-constituent.

Cultivation in the form of summerfallow prepares the seedbed by retaining soil moisture which will facilitate germination. On the other hand, it may lead to the increase in salinity of the soil surface.

Soil compaction results when the soil becomes packed, thereby removing pore spaces. At the surface, air and water cannot penetrate highly compacted soil. Crops have failed when the clayey soil became wet and baked creating an impenetrable barrier to the grain crops.

Management also requires dealing with issues of soil salinity, pH, and the selection and use of fertilizers. A farmer or a gardener must be a scientist, a caretaker, a prophet, and labourer to be a manager.

LAB for Grade 7/8 Science/Agriculture

as written by Tom Zieffle

Period (s): _____

Date: _____

LESSON OBJECTIVE: Preparation for Planting - Practical

ACTIVITIES: Plant propagation: Lab 1-Theory; Lab 2-Cuttings, Seed Germination

BACKGROUND:

There are two kinds of plants gardeners propagate: annuals and perennials. Annuals produce a flower and seed each year.

Propagation of annuals usually is from seed. A few common annuals or bedding plants can be propagated from cuttings (primarily large leaf geraniums).

Perennials are usually propagated vegetatively (doing something to the plant) because of the relatively long period of time needed to produce seed from a flowering plant (usually every other year).

1. **Plant Propagation: division and cuttings.**

Division

Division is the separation of a large plant into smaller pieces. Some plants prosper with frequent division (summer phlos, campanula, columbine and delphinium, among others) and some plants must have a growth period of approximately ten years before separating (peony, gypsophila, bleeding heart among others).

To lift a plant for division, dig around its outer edges. Raise the clump and dissect it into pieces of desired size, each with at least three to five buds present. If any portion is dead or lacks vigor, discard it.

Plants with a bulbous system such as tulips and lilies can be dug after flowering and drying. The bulbs then can be separated and planted individually.

NOTE
If time and circumstances (availability of resources) permit, this method of propagation will be practiced in the spring of the year.

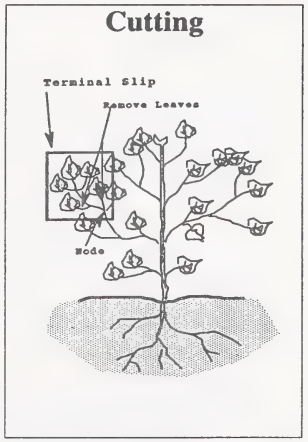
Stem Cuttings

Stem cuttings taken from adult plants have been successfully grown in several mediums; water and soil. Cuttings can be taken from plants in the spring or early summer when the new shoot growth is about 15 cm high. Terminal slips, 7 - 10 cm in length, are removed at or just below a node. The bottom leaves are then removed and the cuttings stuck into a suitable rooting medium in flats or pots.

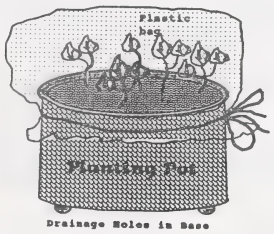
To enhance the rooting process the base of each cutting may be dipped into a rooting hormone prior to being stuck.

To induce rapid shooting, the medium must be kept moist and the surrounding area maintained at a high relative humidity.

Water: Place the slip into a glass containing clean water without chemicals (chlorine and so on) added. Radicles will grow and develop into a root structure that can support growth after transplanting into a soil medium.

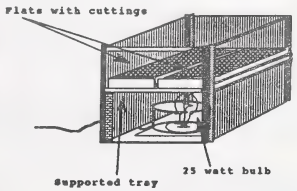


Cutting in a Glass



Propagating Case

(cover case with polystyrene)



Planting Medium

The growing medium may consist of soil or be a soilless composition. Soil should be a combination of three parts loam, two parts peat moss and two parts sand. These soils can be purchased as well as hand mixed. Soilless medium can be purchased commercially. They have the advantage of having much less mass than soil if weight is a requirement. Pure vermiculite and perlite, or a mix of these ingredients with peat, may be used with assurance that the mix will be sterile and weedless. These very loosely packed media will simplify removal for transplanting into permanent pots or growth flats.

Watering

The availability of sufficient moisture is one of the conditions for successful germination; excess moisture can adversely affect it. It is advisable to pre-wet the medium after the ingredients have been mixed. Hot water is better to use than cold, but all media must be allowed to cool prior to planting. A medium is sufficiently wet when it can be formed into a ball that will crumble when tapped lightly with a finger.

After cuttings are stuck or seeds are sown, the medium must be allowed to soak in a sink until you can visibly see the seedbed has darkened with the absorption of water. If this is not possible moisten the seedbed well before sowing and compact the soil surface with a flat piece of wood.

Rewatering should be completed using the above-noted method. Sprinkling water from the top will only encourage disease-causing organisms to grow on the wet surface.

Temperature

The medium temperature should be in excess of 15° C. Since cold water can seriously lower seedbed temperature, use lukewarm water.

Problems to Avoid During Planting and Germination

- seeds or cuttings planted too shallow leading to plant dry-out.
- seeds planted too deep (especially very small seeds) that may make it difficult for the leaves to make it to the surface before the seed's supply of energy is depleted.
- low temperature (below 15° C).
- soil is kept too wet. Seeds start to germinate but rot away due to the excessive moisture.
- soil is too dry and too hot.
- diseases such as fungal infection (damping off).

LAB ACTIVITIES
PART A

Name _____ **Date due** _____ **Mark** _____

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Complete the following:

(2) 1. The fundamental differences between an annual plant and a perennial plant are:

_____

_____

_____

(15) 2. Plant propagation, as discussed in the notes, can be done using three methods. Briefly describe each method.

_____

_____

_____

_____

_____

_____

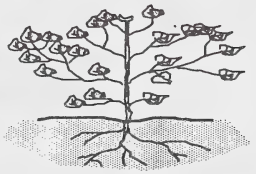
_____

_____

_____

(11) 3. Locate the following:

4 potential terminal slips
4 nodes
1 shoot
stem
root structure



(14) 4. In point form list the process for propagating a cutting from a mature plant using a growth medium (soil or soilless).

_____

_____

_____

_____

_____

_____

(3) 5. What does a 'rooting hormone' do for a terminal slip?

_____

_____

_____

(3) 6. Soilless medium is composed of _____ or _____ and _____.

(3) 7. Watering is an extremely important aspect of plant propagation. List four points a gardener needs to remember when propagating plants from cuttings using soil or soilless media.

_____

_____

_____

_____

(12) 8. List six problems to be avoided during the propagation of plants whether using seed germination or cuttings.

_____

_____

_____

_____

_____

_____

LAB ACTIVITIES
PART B - PRACTICAL

Name _____ Date due _____ Mark _____

180

Complete the following practical activities using the knowledge you have gained during this lesson.

(90) 1. You will conduct three experiments: **A, B** and **C.**

Materials
Bring two each of three kinds of plant cuttings, two glass bottles, 1 kg of potting soil and .5 kg soilless medium (perlite or vermiculite) and three, 4" planting pots.

Experiment A - Cutting propagated in water.

Using two glass bottles, absorbent material (paper towel), some form of packing, and water, place a cutting in each bottle.
a. with rooting hormone.
b. without rooting hormone.

Experiment B - Cutting propagated in soil.

Using a planting pot, place two cuttings in an appropriate soil mix.
a. with rooting hormone.
b. without rooting hormone.

Experiment C - Cutting propagated in soilless medium.

Using a planting pot, place two cuttings in an appropriate soilless mix.
a. with rooting hormone.
b. without rooting hormone.

(90) 2. Using daily observation, record the growth of each cutting under each condition. Comment on root development. The experiment will last 14 days. Use an appropriate experiment reporting format. Plants will be taken home for family appreciation. Three observations are required.

LAB ACTIVITIES
PART A - KEY

Name _____ Date due _____ Mark _____

63

Complete the following:

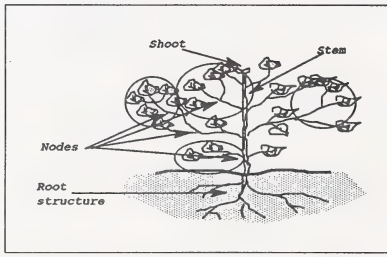
(2) 1. The fundamental differences between an annual plant and a perennial plant are:
annuals - flower, produce seed each year and die
perennials - grow, flower and produce seed every other year

(15)2. Plant propagation, as discussed in the notes can be done using three methods. Briefly describe each method.

*Three methods of propagation were discussed: **division, cuttings** and, indirectly, **seed germination.***
***Division** is the separating of part of a plant, normally the root system, into smaller pieces that will grow into separate healthy plants.*
***Cutting** is the process of removing a portion of the stem and placing it into a growing medium to develop a root structure that will support growth as an independent plant.*
*Indirectly, **seed germination** was referred to when the nature of seedbeds and rooting media were discussed. It is the propagation from individual seed germination and growth.*

(11)3. Locate the following:

4 potential terminal slips
4 nodes
1 shoot
stem
root structure



(14)4. In point form list the process for propagating a cutting from a mature plant using a growth medium (soil or soilless).

1. *Select a terminal slip portion from the parent plant and remove at the node.*
2. *Trim lower leaves closest to the node.*

3. *If your process uses soil or soilless medium, dip the slip end into the rooting hormone.*
4. *Water the medium adequately.*
5. *Carefully plant the slip into the medium and slightly compact the material around the stem end.*
6. *Ensure the temperature exceeds 15° C.*
7. *Ensure adequate light is available to the cuttings.*

{3} 5. What does a 'rooting hormone' do for a terminal slip?

Rooting hormone encourages the development of the radicle and the subsequent root structure. It enhances the conditions for root growth.

{3} 6. Soilless medium is composed of ***vermiculite*** or ***perlite and peat***.

{3} 7. Watering is an extremely important aspect of plant propagation. List four points a gardener needs to remember when propagating plants from cuttings using soil or soilless media.

* *use clean water that is chemical-free.*
* *ensure sufficient moisture is available for germination and cuttings.*
* *use lukewarm water rather than cold to prevent loss of suitable propagation temperature in the seedbed.*
* *the medium is sufficiently wet if it can be rolled into a ball and then broken when tapped with a finger.*
* *water, and rewater from the bottom rather than sprinkling moisture onto the surface of the seedbed.*
* *enable the seedbed to drain to prevent saturation and rotting.*

{12}8. List six problems to be avoided during the propagation of plants either using seed germination or cuttings.

* *seeds or cuttings planted too shallow leading to plant dry-out.*
* *seeds planted too deep (especially very small seeds) that may make it difficult for the leaves to make it to the surface before the seed's supply of energy is depleted.*
* *low temperature (below 15° C).*
* *soil is kept too wet. Seeds start to germinate but rot away due to the excessive moisture.*
* *soil is too dry and too hot.*
* *diseases such as fungal infection (damping off).*

Activity 18

ACCENT ON AGRICULTURE

STUDY QUESTION:

How do physical and human geography affect the agriculture industry?

THE ACTIVITY:

Students will use community resources to research geographic regions and to compare and contrast agriculture in different geographic areas of Canada and the United States.

CURRICULUM FIT:

GRADE EIGHT - SOCIAL STUDIES

- Topic A: Geography of Canada and the United States.
- The interaction of people with their physical environment influences patterns of life.

AGRICULTURE CONCEPTS:

The impact of agriculture on daily lives, flexibility of the industry and its people, the interdependency of agriculture and geography.

PURPOSE:

To enable students to determine and evaluate the consequences of continued resource development.

To enable students to recognize that activities which are normally taken for granted (i.e., agriculture) are actually quite complicated and reliant on many physical factors.

MATERIALS REQUIRED:

List of newspapers from major cities in Canada and the U.S. (attached), copies of newspapers from the regions of study, Textbook "A Geography of Canada and the United States", information from various agricultural organizations such as the Alberta Wheat Pool, United Farmers of Alberta and Alberta Agriculture.

TIME REQUIRED:

Varies according to the degree of detail you choose (from 5 to 12 class periods if the entire activity is followed).

BACKGROUND - For the Teacher

This lesson is designed to be a learning centre approach which allows students to do focused research on geographic regions they have already been exposed to in class. The activity will help students realize that the physical geography of a region affects the nature of its agricultural activities and patterns of human settlement. Students will also learn that agriculture is not just "farming" but, instead, is an industry composed of a variety of people, products, processes and resources. By seeing the huge scope of agriculture, they will learn that agricultural issues impact on all of us and should be of concern to everyone. The lesson has the potential to help students see geography as something "alive" and "evolving".

PROCEDURE

Part 1 Preparation	1.	Give each student a newpaper from a city in one of the four geographic regions to be studied. The four regions are noted on the attached map.
	2.	Students will search their paper for articles they consider to be agriculture-related. The teacher might give them a few examples so that the students do not limit themselves.
Part 2 Introduction	3.	Each student will summarize three articles in two to three sentences. These will be shared with the rest of the class in a brainstorming session about "What does agriculture mean?"
	4.	From the ideas compiled, the class will derive a concept of agriculture. Emphasize the variety of experiences associated with agriculture.
	5.	Before proceeding to one of the four geographic regions, students should be able to define agriculture's importance to their daily lives.
Part 3 Activity	6.	Assign students to one of these four areas: the West, the East, the Interior, the North. Students will work at their respective work centres.
	7.	At each centre, task cards, resource information, newspapers, maps, etc. will be available to complete each task. (Please see attached resources for guidelines and samples.)
Part 4 Conclusion	8.	After students have completed the task cards, they should have a sharing session about what they have learned.

DISCUSSION QUESTIONS

1. Was it easy or difficult to find articles on agricultural topics in the newspaper you worked with? What might this indicate in terms of how the newspaper views agriculture? What might this indicate in terms of the relative importance of agriculture (perceived or real) to that city or region?
2. Examine the nature of the articles. Were they mostly financial, cute human interest (a little child holding a lamb), problems or achievements?
3. If agriculture is such a big industry, why aren't there more articles in the newspaper?
4. What did you learn about people's lives when you read these articles? If you were a farm family member reading those articles, how might it affect you?
5. What sterotypes do some people believe about agriculture in different parts of the continent? Did any of these articles address any of those sterotypes, directly or indirectly?

EVALUATION STRATEGIES

1. Accuracy and completeness of reports, degree of detail, quality of assumptions made, number of resources used and participation skills demonstrated.

RELATED ACTIVITIES

After their sharing of what they have learned, students should select one of the following activities to apply what they have found.

1. Write a letter to one of the newspapers and tell them in a letter to the editor what you have learned about agriculture in their area. Ask readers to write back with additional information that you actually want and will do something with. (Do not ask people to make an effort if you do not really intend to do something with it.)
2. Make a presentation to the rest of the class in any format showing some of the interesting things that you have learned.
3. Write an editorial or poem entitled "Farmers -- an endangered species?"
4. Research a controversial issue involving agriculture. Present all the positions involved and have the class participate in a panel.
5. Invite to class, three to five people who are involved in various aspects of agriculture. Prepare questions ahead of time and interview them to learn about the scope of the industry.
6. Collect food labels from the newspapers that show what people in certain areas eat (or what food manufacturers would like them to eat!!!). Contrast this with the ads in our local papers. What conclusions can be drawn from this activity?
7. Do other projects suggested by students.

RESOURCES

Task Cards for Learning Centres

Guidelines and Examples

1. Task cards will be colour-coded to denote three levels of challenge. For our pruposes, cards will be red, blue and green. Students must do a required number of cards (at least one of each color, but in any combination) to reach 100 points. Red cards will be worth 30 points, blue cards 20 and green cards 10, based on a scale of difficulty. (Teachers can modify these guidelines if they need to.)
2. Prepare a grid to record the progress and coverage of students.
3. Students are allowed to select the cards at random, but they must select from all three colours.

Examples of Some Task Cards

Green:

1. Name three kinds of cattle produced in the Interior region of the continent. Describe each breed and what its positive qualities are.
2. Ask 10 adults what (dairy, beef, pork, grain) product they use most often.
3. Find out how much it costs to buy a pea picking machine in Southern Alberta.
4. Ask the grocery store owner or produce manager how much of the fruit in the displays originates in California.
5. Find out how many different kinds of Atlantic fruit products are available where your family buys food.

Blue:

1. List as many secondary products made from cattle as you can think of in five minutes.
2. Locate Alberta's three biggest feedlots on a map.
3. In your own words tell the class how orange juice is made from oranges.
4. Interview an elevator agent about what his job involves and how it has changed in the last five years.

Red:

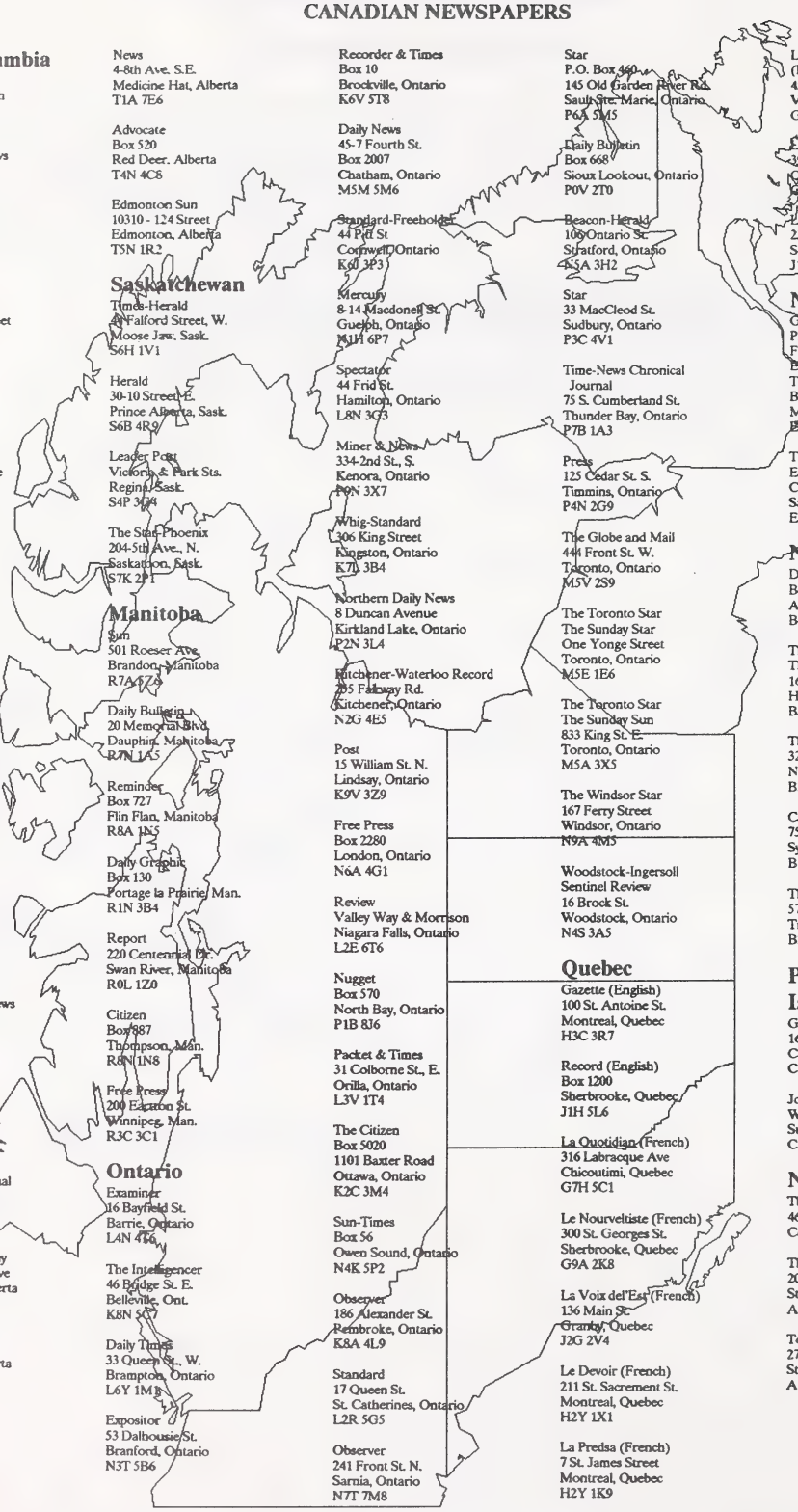
1. Draw a map showing how you would organize a grain farm if you had one.
2. Draw a diagram that shows the route of the grain from the prairies to China.
3. Write a jingle to advertise the contribution that canola oil (beef, pork, milk, etc.) makes to your life.
4. Based on past production figures, predict the future of subsidies in Canada and the United States.
5. Be Alberta's Minister of Agriculture and give a speech to your classmates telling them why they should consider saving farmers in financial difficulty.

NOTE
These are only examples intended to illustrate what can be done. Feel free to alter them for your particular class and purposes.

Original lesson idea and material by Maria P. Lentz
Modifications by AITC

Areas and Regions of North America

CANADIAN NEWSPAPERS



British Columbia

Daily Townsman
31-7th Avenue South
Cranbrook, B.C.
V1C 3J2

Alaska Highway News
9816-96 Street
Fort St. John, B.C.
V1L 3T3

Daily Sentinel
206 Seymour Street
Kamloops, B.C.
V2C 2E1

Daily Free Press
225 Commercial Street
Nanaimo, B.C.
V9R 5K5

Daily News
206 Baker Street
Nelson, B.C.
V1L 1R3

Herald
166 Nanamio Avenue
Penticton, B.C.
V2A 1H4

Alberni Valley Times
4918 Napier Street
Box 400
Port Albernie, B.C.
V9Y 7H1

Citizen
Box 578
Prince George, B.C.
V2L 4T1

Daily News
Box 580
Prince Rupert, B.C.
V2L 4S8

Sun/Province
2250 Grenville Street
Vancouver, B.C.
V6H 3G2

Daily News
3308 - 31 Avenue
Vernon, B.C.
V1T 6N8

Colonist-Times
Box 300
Victoria, B.C.
V8W 2N4

Peace River Block News
Box 180
Dawson Creek, B.C.
V1G 4G6

Alberta

Herald
206-7th Avenue, S.W.
Calgary, Alberta
T2P 0W8

The Edmonton Journal
10006 - 101 Street
Edmonton, Alberta
T5J 2S6

Fort McMurray Today
10204 Centennial Drive
Fort McMurray, Alberta
T0A 1K0

Daily Herald-Tribune
10604 - 100 Street
Grande Prairie, Alberta
T8V 2M5

Herald
504 - 7th Street
Lethbridge, Alberta
T1J 3Z7

News
4-8th Ave. S.E.
Medicine Hat, Alberta
T1A 7E6

Advocate
Box 520
Red Deer. Alberta
T4N 4C8

Edmonton Sun
10310 - 124 Street
Edmonton, Alberta
T5N 1R2

Saskatchewan

Times-Herald
40 Fafford Street, W.
Moose Jaw, Sask.
S6H 1V1

Herald
30-10 Street E.
Prince Alberta, Sask.
S6B 4R9

Leader Post
Victoria & Park Sts.
Regina, Sask.
S4P 3G4

The Star-Phoenix
204-5th Ave., N.
Saskatoon, Sask.
S7K 2P1

Manitoba

Sun
501 Roeser Ave.
Brandon, Manitoba
R7A 4Z8

Daily Bulletin
20 Memorial Blvd
Dauphin, Manitoba
R7N 1A5

Reminder
Box 727
Flin Flan, Manitoba
R8A 1N5

Daily Graphic
Box 130
Portage la Prairie, Man.
R1N 3B4

Report
220 Centennial Dr.
Swan River, Manitoba
R0L 1Z0

Citizen
Box 887
Thompson, Man.
R8N 1N8

Free Press
200 Edmon St.
Winnipeg, Man.
R3C 3C1

Ontario

Examiner
16 Bayfield St.
Barrie, Ontario
L4N 4Z6

The Intelligencer
46 Bridge St. E.
Belleville, Ont.
K8N 5A7

Daily Times
33 Queen St., W.
Brampton, Ontario
L6Y 1M8

Expositor
53 Dalhousie St.
Branford, Ontario
N3T 5B6

Recorder & Times
Box 10
Brockville, Ontario
K6V 5T8

Daily News
45-7 Fourth St.
Box 2007
Chatham, Ontario
M5M 5M6

Standard-Freeholder
44 Pitt St
Cornwall, Ontario
K6J 3P3

Mercury
8-14 Macdonell St.
Guelph, Ontario
N1H 6P7

Spectator
44 Frid St.
Hamilton, Ontario
L8N 3G3

Miner & News
334-2nd St., S.
Kenora, Ontario
P9N 3X7

Whig-Standard
306 King Street
Kingston, Ontario
K7L 3B4

Northern Daily News
8 Duncan Avenue
Kirkland Lake, Ontario
P2N 3L4

Kitchener-Waterloo Record
365 Fairway Rd.
Kitchener, Ontario
N2G 4E5

Post
15 William St. N.
Lindsay, Ontario
K9V 3Z9

Free Press
Box 2280
London, Ontario
N6A 4G1

Review
Valley Way & Morrison
Niagara Falls, Ontario
L2E 6T6

Nugget
Box 570
North Bay, Ontario
P1B 8J6

Packet & Times
31 Colborne St., E.
Orilla, Ontario
L3V 1T4

The Citizen
Box 5020
1101 Baxter Road
Ottawa, Ontario
K2C 3M4

Sun-Times
Box 56
Owen Sound, Ontario
N4K 5P2

Observer
186 Alexander St.
Pembroke, Ontario
K8A 4L9

Standard
17 Queen St.
St. Catherines, Ontario
L2R 5G5

Observer
241 Front St. N.
Sarnia, Ontario
N7T 7M8

Star
P.O. Box 460
145 Old Garden River Rd.
Sault Ste. Marie, Ontario
P6A 5M5

Daily Bulletin
Box 668
Sioux Lookout, Ontario
P0V 2T0

Beacon-Herald
100 Ontario St.
Stratford, Ontario
N5A 3H2

Star
33 MacCleod St.
Sudbury, Ontario
P3C 4V1

Time-News Chronical
Journal
75 S. Cumberland St.
Thunder Bay, Ontario
P7B 1A3

Press
125 Cedar St. S.
Timmins, Ontario
P4N 2G9

The Globe and Mail
444 Front St. W.
Toronto, Ontario
M5V 2S9

The Toronto Star
The Sunday Star
One Yonge Street
Toronto, Ontario
M5E 1E6

The Toronto Star
The Sunday Sun
833 King St. E.
Toronto, Ontario
M5A 3X5

The Windsor Star
167 Ferry Street
Windsor, Ontario
N9A 4M5

Woodstock-Ingersoll
Sentinel Review
16 Brock St.
Woodstock, Ontario
N4S 3A5

Quebec

Gazette (English)
100 St. Antoine St.
Montreal, Quebec
H3C 3R7

Record (English)
Box 1200
Sherbrooke, Quebec
J1H 5L6

La Quotidian (French)
316 Labracque Ave
Chicoutimi, Quebec
G7H 5C1

Le Nouveltiste (French)
300 St. Georges St.
Sherbrooke, Quebec
G9A 2K8

La Voix del'Est (French)
136 Main St.
Granby, Quebec
J2G 2V4

Le Devoir (French)
211 St. Sacrement St.
Montreal, Quebec
H2Y 1X1

La Predsa (French)
7 St. James Street
Montreal, Quebec
H2Y 1K9

Le Journal de Quebec
(French)
450 Bechard St.
Ville de Vanier, Quebec
G1M 2E9

Le Soiell (French)
395 St. Vallier St. E.
Quebec, Quebec
G1K 7J6

La Tribune (French)
221 Dufferin St.
Sherbrooke, Quebec
J1H 4M3

New Brunswick

Gleaner
P.O. Box 3370
Fredericton, New Brunswick
E3B 5A2
Times and Transcript
Box 1001
Moncton, New Brunswick
E1C 8P3

Telegraph-Journal &
Evening Times - Globe
Crown St. at Union Sts.
Saint John, New Brunswick
E2L 3V8

Nova Scotia

Daily News
Box 280
Amherst, Nova Scotia
B4H 3Z2

The Chronicle-Herald
The Mall - Star
1650 Argyle St.
Halifax, Nova Scotia
B3J 2T2

The Evening News
325 East River Rd.
New Glasgow, Nova Scotia
B2H 5E2

Cape Breton Post
75 Dorchester St.
Sydney, Nova Scotia
B1P 5Z2

The Daily News
576 Prince St.
Truro, Nova Scotia
B2N 5C3

Prince Edward Island

Guardian and Patriot
165 Prince St.
Charlottetown, P.E.I.
C1A 4R7

Journal-Pioneer
Water St. at Queen
Summerside, P.E.I.
C1N 4K5

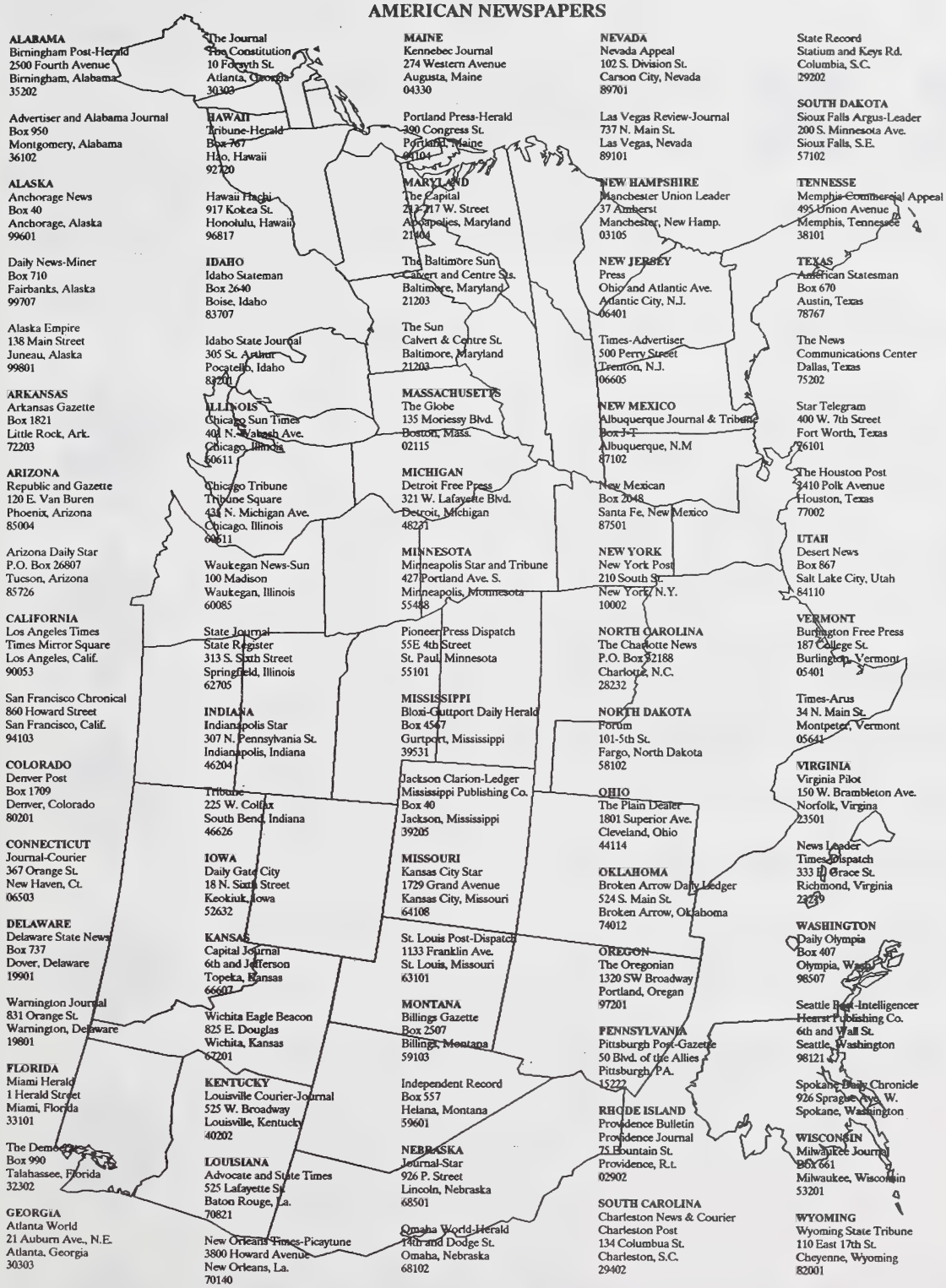
Newfoundland

The Western Star
460 West St.
Cornerbrook, Newfoundland

The Daily News
206 Water Street
St. John's, Newfoundland
A1B 3V2

Telegram
273 Duckworth St.
St. John's, Newfoundland
A1C 5X7

AMERICAN NEWSPAPERS



ALABAMA
Birmingham Post-Herald
2500 Fourth Avenue
Birmingham, Alabama
35202

Advertiser and Alabama Journal
Box 950
Montgomery, Alabama
36102

ALASKA
Anchorage News
Box 40
Anchorage, Alaska
99601

Daily News-Miner
Box 710
Fairbanks, Alaska
99707

Alaska Empire
138 Main Street
Juneau, Alaska
99801

ARKANSAS
Arkansas Gazette
Box 1821
Little Rock, Ark.
72203

ARIZONA
Republic and Gazette
120 E. Van Buren
Phoenix, Arizona
85004

Arizona Daily Star
P.O. Box 26807
Tucson, Arizona
85726

CALIFORNIA
Los Angeles Times
Times Mirror Square
Los Angeles, Calif.
90053

San Francisco Chronical
860 Howard Street
San Francisco, Calif.
94103

COLORADO
Denver Post
Box 1709
Denver, Colorado
80201

CONNECTICUT
Journal-Courier
367 Orange St.
New Haven, Ct.
06503

DELAWARE
Delaware State News
Box 737
Dover, Delaware
19901

Warnington Journal
831 Orange St.
Warnington, Delaware
19801

FLORIDA
Miami Herald
1 Herald Street
Miami, Florida
33101

The Democrat
Box 990
Talahassee, Florida
32302

GEORGIA
Atlanta World
21 Auburn Ave., N.E.
Atlanta, Georgia
30303

The Journal
The Constitution
10 Forsyth St.
Atlanta, Georgia
30303

HAWAII
Tribune-Herald
Box 767
Hilo, Hawaii
92720

Hawaii Hochi
917 Kokea St.
Honolulu, Hawaii
96817

IDAHO
Idaho Stateman
Box 2640
Boise, Idaho
83707

Idaho State Journal
305 St. Arthur
Pocatello, Idaho
83201

ILLINOIS
Chicago Sun Times
401 N. Wabash Ave.
Chicago, Illinois
60611

Chicago Tribune
Tribune Square
435 N. Michigan Ave.
Chicago, Illinois
60611

Waukegan News-Sun
100 Madison
Waukegan, Illinois
60085

State Journal
State Register
313 S. Sixth Street
Springfield, Illinois
62705

INDIANA
Indianapolis Star
307 N. Pennsylvania St.
Indianapolis, Indiana
46204

Tribune
225 W. Colfax
South Bend, Indiana
46626

IOWA
Daily Gate City
18 N. Sixth Street
Keokiuk, Iowa
52632

KANSAS
Capital Journal
6th and Jefferson
Topeka, Kansas
66607

Wichita Eagle Beacon
825 E. Douglas
Wichita, Kansas
67201

KENTUCKY
Louisville Courier-Journal
525 W. Broadway
Louisville, Kentucky
40202

LOUISIANA
Advocate and State Times
525 Lafayette St.
Baton Rouge, La.
70821

New Orleans Times-Picaytune
3800 Howard Avenue
New Orleans, La.
70140

MAINE
Kennebec Journal
274 Western Avenue
Augusta, Maine
04330

Portland Press-Herald
390 Congress St.
Portland, Maine
04104

MARYLAND
The Capital
213-217 W. Street
Annapolis, Maryland
21404

The Baltimore Sun
Calvert and Centre Sts.
Baltimore, Maryland
21203

The Sun
Calvert & Centre St.
Baltimore, Maryland
21203

MASSACHUSETTS
The Globe
135 Moriessy Blvd.
Boston, Mass.
02115

MICHIGAN
Detroit Free Press
321 W. Lafayette Blvd.
Detroit, Michigan
48231

MINNESOTA
Minneapolis Star and Tribune
427 Portland Ave. S.
Minneapolis, Minnesota
55488

Pioneer Press Dispatch
55E 4th Street
St. Paul, Minnesota
55101

MISSISSIPPI
Bloxi-Gurtport Daily Herald
Box 4567
Gurtport, Mississippi
39531

Jackson Clarion-Ledger
Mississippi Publishing Co.
Box 40
Jackson, Mississippi
39205

MISSOURI
Kansas City Star
1729 Grand Avenue
Kansas City, Missouri
64108

St. Louis Post-Dispatch
1133 Franklin Ave.
St. Louis, Missouri
63101

MONTANA
Billings Gazette
Box 2507
Billings, Montana
59103

Independent Record
Box 557
Helana, Montana
59601

NEBRASKA
Journal-Star
926 P. Street
Lincoln, Nebraska
68501

Omaha World-Herald
14th and Dodge St.
Omaha, Nebraska
68102

NEVADA
Nevada Appeal
102 S. Division St.
Carson City, Nevada
89701

Las Vegas Review-Journal
737 N. Main St.
Las Vegas, Nevada
89101

NEW HAMPSHIRE
Manchester Union Leader
37 Amherst
Manchester, New Hamp.
03105

NEW JERSEY
Press
Ohio and Atlantic Ave.
Atlantic City, N.J.
06401

Times-Advertiser
500 Perry Street
Trenton, N.J.
06605

NEW MEXICO
Albuquerque Journal & Tribune
Box J-T
Albuquerque, N.M
87102

New Mexican
Box 2048
Santa Fe, New Mexico
87501

NEW YORK
New York Post
210 South St.
New York, N.Y.
10002

NORTH CAROLINA
The Charlotte News
P.O. Box 32188
Charlotte, N.C.
28232

NORTH DAKOTA
Forum
101-5th St.
Fargo, North Dakota
58102

OHIO
The Plain Dealer
1801 Superior Ave.
Cleveland, Ohio
44114

OKLAHOMA
Broken Arrow Daily Ledger
524 S. Main St.
Broken Arrow, Oklahoma
74012

OREGON
The Oregonian
1320 SW Broadway
Portland, Oregan
97201

PENNSYLVANIA
Pittsburgh Post-Gazette
50 Blvd. of the Allies
Pittsburgh, PA.
15222

RHODE ISLAND
Providence Bulletin
Providence Journal
75 Fountain St.
Providence, R.t.
02902

SOUTH CAROLINA
Charleston News & Courier
Charleston Post
134 Columbua St.
Charleston, S.C.
29402

State Record
Statium and Keys Rd.
Columbia, S.C.
29202

SOUTH DAKOTA
Sioux Falls Argus-Leader
200 S. Minnesota Ave.
Sioux Falls, S.E.
57102

TENNESSE
Memphis Commercial Appeal
495 Union Avenue
Memphis, Tennessee
38101

TEXAS
American Statesman
Box 670
Austin, Texas
78767

The News
Communications Center
Dallas, Texas
75202

Star Telegram
400 W. 7th Street
Fort Worth, Texas
76101

The Houston Post
5410 Polk Avenue
Houston, Texas
77002

UTAH
Desert News
Box 867
Salt Lake City, Utah
84110

VERMONT
Burlington Free Press
187 College St.
Burlington, Vermont
05401

Times-Arus
34 N. Main St.
Montpeter, Vermont
05641

VIRGINIA
Virginia Pilot
150 W. Brambleton Ave.
Norfolk, Virgina
23501

News Leader
Times-Dispatch
333 E. Grace St.
Richmond, Virginia
23219

WASHINGTON
Daily Olympia
Box 407
Olympia, Wash.
98507

Seattle Post-Intelligencer
Hearst Publishing Co.
6th and Wall St.
Seattle, Washington
98121

Spokane Daily Chronicle
926 Sprague Ave. W.
Spokane, Washington

WISCONSIN
Milwaukee Journal
PO 661
Milwaukee, Wisconsin
53201

WYOMING
Wyoming State Tribune
110 East 17th St.
Cheyenne, Wyoming
82001

Activity 19

AGRICULTURAL ISSUES IN THE NEWS

STUDY QUESTION:

What is going on around me and how does it affect me? What conflicts exist in agriculture and how can they be resolved?

THE ACTIVITY:

Students review newspapers or magazines, choose articles and analyze and react to the articles. They suggest solutions to problems they identify within the articles.

CURRICULUM FIT:

GRADE NINE - SCIENCE

- Topic 6: Environmental Quality.
- Human actions modify environments through direct changes to living things, water, air and land; also through indirect effects.

GRADE NINE - LANGUAGE ARTS

- Evaluate the reality created in media products.

AGRICULTURE CONCEPTS:

What forces in society and nature affect agriculture? Identifying issues and making informed decisions.

PURPOSE:

To increase awareness of agricultural issues and their effect on our lifestyles.

To develop critical thinking and analytical and presentation skills.

MATERIALS REQUIRED:

Newspapers, magazines, television and radio broadcasts, access to "people in the know" (optional but recommended), project journal and evaluation forms (included for photocopying).

TIME REQUIRED:

Varies from two class periods plus homework to several weeks depending on how detailed the teacher wants the project to be.

BACKGROUND - For the Teacher

This activity brings science alive in a local sense for your students. Using fresh topics from the local media, students develop analytical and problem-solving skills. They also develop critical thinking skills as they study how the different sides to an issue present their cases. The lesson provides for independent research either by individuals or groups. It also allows students to utilize language arts skills.

PROCEDURE

Part 1 Introduction	1.	Students review and cut out three printed articles from any newspaper or magazine relating to any agricultural issue. The teacher may wish to review a few examples so that students do not limit themselves to a narrow interpretation of what agricultural issues are.
	2.	Students glue or tape each article onto separate pages, noting the source and date of the article.
Part 2 Activity	3.	Students write a brief summary of each article, including a personal critical reaction to what they read. These two to three paragraphs should provide a review of the facts and suggest alternatives/other concerns to the problem or solution presented.
	4.	Students find and cut out an advertisement relating to an agricultural issue or product or a position presented by a sector of the agriculture world or use the actual advertising from the packaging of a product. Glue/tape to a piece of paper. Provide a critique of what the ad is really about. This can be accomplished in one or two well- written sentences.
	5.	Students complete the assignment with a poem and illustration (or cartoon) suggesting possible solutions to an issue in agriculture. Students can entitle this page, "I think we should ... "
Part 3 Conclusion	6.	After reviewing the assignments, there may be several topics which you may wish to enlarge upon with the class. This would also be an opportunity to clarify misinterpretations.
	7.	Students can then do a more in-depth investigation of an agricultural issue or conflict. (For example, students can examine the impact the Old Man River Dam will have on agriculture and on the environment.) Assign work groups or let students pick work groups according to the topic they wish to research.
	8.	Using the sample form provided, students describe the project and how they intend to proceed.
	9.	All students keep a log of their progress, questions they are following and answers they are finding. A project journal is provided for this purpose.
	10.	Students summarize their investigation in a presentation to the class and in writing (includes journal, other written data, self- evaluation, and any other references and handouts). Students are to present at least two sides to each issue.

DISCUSSION QUESTIONS

1. What seem to be major issues in agriculture today? What are the forces and motivations involved in these issues?
2. How many sides are there to an issue? Can these contentious issues be resolved? (You may wish to choose a particular example on which to focus the discussion.)
3. How does this issue affect you or your family today? How will it do so in the future?

EVALUATION STRATEGIES

1. Quality of presentations, analysis of problems and solutions, participation in discussions, quality of written material and other prepared visuals, self and peer evaluation.

RELATED ACTIVITIES

1. Invite guest speakers to talk about specific topics (students should prepare interview questions in advance).

2. Students monitor local news broadcasts for one week to identify what agricultural issues are discussed and what arguments are made from all sides of the issues. Students should prepare a log or checklist for recording key points made.

Original lesson idea by Dale Curley
Modifications by AITC

STUDENT RESOURCE

SHEET ONE --

Project Description

Student _____ Class _____

Subject _____

Other Group Members: (if applicable)

1. _____
2. _____
3. _____
4. _____

Start Date of Project: _____

Briefly describe the Project

_____
_____
_____
_____

Are there any special requests/needs that your group will encounter while doing the project?

_____
_____
_____
_____
_____
_____

The Student Resource Sheets are to be handed in to the teacher as part of your written assignment. Write legibly and use extra paper if needed.

STUDENT RESOURCE

SHEET TWO --

Project Journal -- SCIENCE

The purpose of this journal is to allow you to reflect and plan your project so that you will be able to learn efficiently. This method of time-management is to be completed before the end of each class and to be turned in with your project.

Class #1

_____
_____
_____
_____
_____

Class #2

_____
_____
_____
_____
_____

Class #3

_____
_____
_____
_____
_____

The Student Resource Sheets are to be handed in to the teacher as part of your written assignment. Write legibly and use extra paper if needed.

STUDENT RESOURCE

Class #4

Class #5

Class #6

Class #7

Class #8

Class #9

STUDENT RESOURCE

Class #10

Class #11

Class #12

Class #13

Class #14

Class #15

STUDENT RESOURCE

SHEET THREE --
Self Evaluation of Projects

Student _____ Class _____

Subject _____

Other Group Members: (if applicable)

1. _____
2. _____
3. _____
4. _____

Start Date of Project: _____

Briefly describe the Project

_____

_____

_____

		Oh No	So So			Amazing
(A)	Time/Effort/Energy					
1)	Class time was used wisely	1	2	3	4	5
2)	Maximum effort was displayed	1	2	3	4	5
3)	High energy was devoted to this project	1	2	3	4	5

Comments:

(B)	Group Members (if applicable)					
1)	Everyone clearly knew responsibilities to project	1	2	3	4	5
2)	All members carried their fair share	1	2	3	4	5
3)	The group worked very well together	1	2	3	4	5

Comments:

(C)	Presentation/Rough Draft of Project					
1)	Stuck to original plan	1	2	3	4	5
2)	Rough draft and scale were used to complete project	1	2	3	4	5
3)	Knowledge of material	1	2	3	4	5
4)	Justification of Model	1	2	3	4	5
	- Realistic, does it make sense, could it be used?					
5)	Ability to answer questions from audience/teacher	1	2	3	4	5

Comments:

STUDENT RESOURCE

SHEET FOUR --
Project Marking Sheet

(This sheet is to be handed in to the teacher along with your other materials).

Topic: _____

Group Members:

_____ _____

_____ _____

_____ _____

Section A: The Written Portion — This includes your journal, the written data, self-evaluation, references and any handouts.

/25

Section B: The Presentation — This includes the actual delivery of the material, visual displays and a clear representation of all sides of the issue.

/25

Activity 20

FOOD CHAINS, WEBS AND PYRAMIDS

STUDY QUESTION:

What food webs, chains and pyramids operate within agriculture in Alberta?

THE ACTIVITY:

Students research and debate the merits and drawbacks of introducing triploid grass carp into the irrigation canal systems of Alberta.

CURRICULUM FIT:

DIVISION FOUR - SCIENCE 14

- Investigating the Environment -- the influence of science and technology; interaction of organisms within an ecosystem (food chains, webs and pyramids).

DIVISION FOUR - BIOLOGY 20

- Mankind's activities may affect the ecosystem.

AGRICULTURE CONCEPTS:

Resource management, problem-solving.

PURPOSE:

To demonstrate how the natural process of food chains can be used to benefit an industry.

To expose students to the controversies of using biological controls to meet human needs.

To introduce students to the idea of using biological instead of chemical control over weeds.

MATERIALS REQUIRED:

Article "Triploid Grass Carp Research in Alberta" (attached), examples (live or on film) of a food chain in action, Biology 20 textbook by Silver.

TIME REQUIRED:

Two and one-half class periods.

BACKGROUND - For the Teacher

This activity provides an opportunity to analyze the consequences of introducing biological technology into an ecosystem. What may initially appear to be a simple intervention with big pay-offs, will, after further study and debate, prove to be not that simple a decision after all. The exercise uses an Alberta example of introducing triploid carp into the irrigation canal system to reduce weeds, thereby facilitating water flow. The students take a side on the issue and, as they investigate the consequences of their decision, become intimate with the impact on the food chains that lead to and from the carp in the system.

PROCEDURE

Day One -- introduce the concept of food chains, webs and pyramids

Part 1
Preparation

1. Show the students an example of the food chain in action (e.g., insects - frog - snake) live or by a clip from a video or slides. Be thoughtful of the sensitivities of your students when choosing the "victim" of this demonstration.
2. With the students, define what a food chain is and generate examples that they are familiar with. Draw these on the board or use the students to physically represent the different links in the chain.
3. Ask them what happens when you change or eliminate a link in the chain. This can be physically demonstrated if the students are linked together. This is a good way to introduce the concepts of competition and over-supply.
4. Students draw a food web with which they are familiar. Where do humans fit into food webs or chains?

Part 2
Introduction

5. Provide students with a copy of the article "Triploid Grass Carp Research in Alberta" (attached). Assign it to be read.
6. Explain that these carp are sterile. They are considered a food delicacy by some people. Ask the students to consider how the carp would fit in and affect a food web in an irrigation canal and lake. Show the photographs of dugouts with and without carp (included).

Part 3
Activity

7. Assign each student with a role to play in a debate "Resolved that triploid grass carp will be introduced into the irrigation canals and lakes in Alberta". Explain the basic procedures of debate (see "Debating Procedure, Simplified" in appendices). The students must develop their roles from their notes and the article on carp as well as any other knowledge they have of similar interventions. (e.g., the introduction of rabbits into Australia).

The roles include: scientists from the department of environment/ agriculture, activists (pro/con), environmentalists, sport fishermen, commercial fishing groups, farmers, and the Carp Connoisseur Society. It is also helpful to assign the role of recording points made by both sides of the argument to two or more people who will track the debate.

Day Two -- The Debate

8. As the debate progresses, note the arguments made by the individuals for later comment and feedback.
9. Debriefing. Use the questions suggested in "For Discussion" or those that are stimulated by your class.

Day Three

Part 4
Conclusion

10. Give a 20 minute quiz on food webs and chains.

DISCUSSION QUESTIONS

1. Are food chains static? Are the food chains that exist today the same ones that existed when Alberta was settled? What are the factors that impact on food chains? Be specific.
2. If you wanted to draw a perfectly accurate diagram of the food chain/ web/pyramid of an irrigation ditch in Southern Alberta, what steps would you have to take? (How do you do accurate research without your presence affecting the results you get? How do you get complete information?)
3. What impact does an open dump site have on the food chains in a National Park? What problems can this contribute to?
4. What impact would an increase of field mice have on the food chain in a grain field in Alberta? What changes could you expect to see over a year or two? (What do the mice feed on? What feeds on the mice?)
5. What are the benefits/drawbacks of using biological versus chemical or mechanical methods of weed control in irrigation canals?

EVALUATION STRATEGIES

1. Participation in debate, quiz and exams.

RELATED ACTIVITIES

1. Draw a diagram that shows some of the food chains that native Albertans were part of before settlers arrived. Draw a diagram that shows how settlement of the prairies changed this (could be presented in poster or model form or perhaps as a role play, song or poem).
2. Consider and report how you fit into the food chain.

Original lesson idea by Daryl Chichak
Modifications by AITC

STUDENT RESOURCE

SHEET ONE --

Triploid Grass Carp Research in Alberta

PREPARED BY: The Committee on Biological Control of Aquatic Vegetation

The idea of using a biological control agent such as the triploid grass carp (Ctenopharyngodon idella) for the control of undesirable submersed aquatic vegetation in irrigation canals is not new. The present five-year research plan initiated by Alberta Agriculture in cooperation with Alberta Forestry, Lands and Wildlife, and along with Alberta Environment, Alberta Irrigation Projects Association and Agriculture Canada is a first for Alberta and probably Canada. The Committee on Biological Control of Aquatic Vegetation was formed to oversee this research and has representation from the above agencies. Funding for this five-year research project has been approved by the Irrigation Council of Alberta from the Alberta Heritage Savings Trust Fund - Irrigation Rehabilitation and Expansion Research Program.

World literature on the grass carp or white amur, as it is known throughout Europe, is very extensive with thousands of research reports published. It is increasingly apparent that this fish is serving as an important element in the management of aquatic vegetation in many countries.

Detailed review of the published works reveals that it is indeed a domesticated species that has certain derived characteristics, much as the cow or horse, to serve man's needs in a particular fashion for a particular purpose. Current research may indicate that this fish from eastern Asia could be an answer to some of our aquatic vegetation management problems in our irrigation conveyance systems.

Almost since irrigation began in this region in the early 1900s, aquatic weed growth in canals has impeded water flow causing serious water delivery shortages during critical crop growing periods. Southern Alberta has over 485,000 hectares of irrigated land and more than 8,000 kilometres of open canals (the majority of which are earth-lined) providing conditions that are ideal for the prolific growth of rooted submersed aquatic plants. Mechanical and chemical control methods presently used are costly and often ineffective.

Richardson pondweed (Potamogeton richardsonii), Sago pondweed (P. pectinatus), giant pondweed (P. vaginatus), and narrow-leaved water plantain (Alisma gramineum) are the four main species of aquatic plants found in delivery canal systems. However, Southern Alberta has over 20 different species of native aquatic plants which is more than generally inhabit the waterways of the southern United States. Flow rates in canals may be reduced by as much as 80 per cent, due to heavy growths of aquatic vegetation.

Grass carp are one of the largest members of the minnow family (Cyprinidae) and can reach a weight of over 45 kg. However, the sterile triploid grass carp are not expected to reach much over 10 - 15 kg. Their life span is between five and eleven years. They can tolerate water temperatures from 10 to 33° C. Temperature greatly affects the amount of food consumed by adult triploid grass carp. At temperatures under 10° C food intake is curtailed, but above 18° C feeding greatly increases. At 20° C the fish may eat about 50 per cent of their weight per day increasing their intake to 100 per cent body weight at 22° C.

Grass carp in their native rivers reach maturity between the ages of four and ten years depending on food supply and water temperature.

The fish will only reproduce naturally under very specific conditions in river systems. The water temperature must be 19° C plus water must be rising dramatically, well oxygenated, turbid, and with a current swift enough to keep eggs afloat from 50 to 180 km of river. Spawning outside its natural Chinese rivers is rare but has occurred in the USSR, Japan, Mexico and in the lower Mississippi River system of the United States.

Efforts to produce functionally sterile grass carp for vegetation control began because of the fear that the naturalization of grass carp could mean the elimination of vegetation from non-target sites important to fish and wildlife resources. Sterile triploid fish have three sets of chromosomes, rather than the normal diploid condition of two sets (one from each parent). Many methods of sterilization have been tried such as heat and cold shocks, radiation, surgical removal of sexual organs, and pressure shock.

Induction of triploidy in grass carp has been most successfully accomplished by means of the

SHEET ONE -- (cont'd)

Triploid Grass Carp Research in Alberta

PREPARED BY THE: Committee on Biological Control of Aquatic Vegetation

pressure shock, giving approximately 98 per cent triploids. Pressure shocks involve taking the fertilized eggs and submitting them to a pressure of 8000 psi for two to three minutes in a steel cylinder. Triploidy is confirmed by the Coulter Counter® method.

To avoid the introduction of new fish diseases or parasites into Alberta, the committee imported approximately 5000 four-day old larval triploid grass carp via air cargo from Florida. After 13 months in the Alberta Environmental Centre's quarantine facility, a total of 1300 confirmed triploids have been transported south to selected dugouts in the Raymond Irrigation District for raising in the second year of the study. The remaining stock in the Environmental Centre will be destroyed upon completion of this research program.

The triploid grass carp is not like its cousin, the common European carp, which was introduced to North America about a hundred years ago. This common carp obtains its food by grubbing and rooting in the bottom sediments for roots and decaying matter. Water turbidity may increase to the extent that it becomes a muddy mess. In contrast, the triploid grass carp is an open water feeder (surface or mid-water) using its two sets of pharyngeal teeth to tear off and masticate vegetation.

Predator fish, such as the northern pike, may be one of the major limiting factors here in Canada. Barriers will have to be built to keep large pike out of study areas and the triploids in. Where pike are present, the triploid grass carp will have to be a minimum of 40 cm in length to prevent heavy losses to this large predator.

Throughout the first year of the study in 1988 the committee completed ten components of the task: literature search and information filing of over 2000 published technical papers; tour of grass carp research facilities in Denver, Colorado; raising fish in quarantine; health evaluations; water quality studies in dugouts and canals; water temperature study; plant biomass study; stocking location selections; predator study; and assessment of the potential use of grass carp in irrigation canals in southern Alberta.

In year two, the fish were raised in shallow aquatic weed infested dugouts and were transferred in fall to deep oxygen rich winter dugouts. As in year one, the fish were checked on a regular basis for bacteria, viral and parasitic agents. The various component studies will continue throughout the duration of the study.

In years three and four, the carp were stocked in a canal in the Raymond Irrigation District. This district is a preferred location because if there was an accidental movement of the sterile fish away from the controlled stocking site, they would end up in land-locked Pakowki Lake and not in a river system. As of July, 1991, results were positive as the carp have provided excellent control of weeds. Test areas showed an 84 per cent reduction in weed biomass. The triploid grass carp is a proven effective biological control agent for aquatic weeds in many parts of the world and specific states in the United States; however, here in Canada, until this time, little or no research has been done using the triploid grass carp. The Committee on Biological Control of Aquatic Vegetation feels that its cautious five-year pilot research plan, using only small stockings of certified sterile fish away from any river system, is an environmentally safe approach. This research will provide many answers as to whether this herbivorous fish should ever be considered for introduction into Alberta. A final report will be done in 1992, the last year of the study.

Contact person:

E.D. Lloyd, Chairman
Committee on Biological Control
of Aquatic Vegetation
Agriculture Centre,
Lethbridge, Alberta T1J 4C7
Telephone (403) 381-5539

(Mr. Lloyd and his colleagues are willing to provide further information to interested students.)

STUDENT RESOURCE

SHEET TWO --

Collecting plant specimens for the plant biomass study in a 5 km reach of the Raymond Main Canal which will be stocked with triploid grass carp in the third, fourth and fifth years of the study.

The triploid grass carp are being kept in the dugouts to grow to a length of approximately 40 cm. They will then be stocked in a flowing canal in the third year of the study. Predatorization by northern pike, known to lurk in irrigation canals, should be minimal at this size.

The area on the right side of the barrier in the dugout is stocked with triploid grass carp.

NOTE: *The school of triploids at bottom right of picture and heavy vegetation growth on left side in control area.*

Activity 21

THIS IS THE JOB THAT JACK AND JILL BUILT

STUDY QUESTION: What career choices exist in agriculture that might interest me?

THE ACTIVITY: Students trace the path of one Alberta food product from farm to consumer and link all the related occupations which facilitated that movement.

CURRICULUM FIT:

DIVISION FOUR - C.A.L.M. 20

- Identify alternatives.
- Research educational requirements.
- Relate knowledge of personal lifestyle to occupations.
- Relate personal skills, aptitudes and knowledge to occupational requirements and decision-making.

AGRICULTURE CONCEPTS: Agriculture as a major generator of employment.

PURPOSE: To expose students to the wide variety of challenging occupational opportunities which support the industry of agriculture.

MATERIALS REQUIRED: See attached resources.

TIME REQUIRED: One class period plus homework assignment.

BACKGROUND - For the Teacher

The food industry will always exist in some form or another and therefore warrants closer investigation for potential employment. The variety of occupations linked to or spun off by the industry will probably surprise and encourage your students.

PROCEDURE

Part 1 Introduction	1.	Using an example of an Alberta agricultural product, chart the path of the product from the farm/ranch to the consumer. (Sample attached.)
	2.	With the students, brainstorm all the services and occupations that facilitated the movement of that product. Chart them in. (You will need lots of space.)
Part 2 Activity	3.	Assign the students the task of selecting an agricultural product, charting its steps in reaching the consumer and identifying at least 25 occupations which facilitated that movement.
	4.	Students will be responsible for researching the "requirements" for five of those occupations which most appeal to them. (Five is an arbitrary figure. You decide.)
Part 3 Conclusion	5.	Reports can be done in small groups or in writing. You can select groups by the products they chose or by the types of training required for the occupations they chose to research.
	6.	Some of the charts can be posted for the information of others.

DISCUSSION QUESTIONS

1. What were some of the conclusions you came to when doing this exercise?
2. Would you have considered the industry of agriculture a possible employment opportunity before completing this exercise? Does it seem more like a possibility now?
3. What opportunities exist for entrepreneurs within this industry?
4. What follow-up do you need to do now?

EVALUATION STRATEGIES

1. Completeness of chart, depth of information attained, initiative in research and follow-up.

RELATED ACTIVITIES

1. View video tapes "Space Age Agriculture" and "The Reason Why" (also 16 mm film). Available by mail request from Alberta Agriculture Film Library, 7000 - 113 Street, Edmonton, Alberta T6H 5T6.

RESOURCES

1. **Occupational Profiles**
   Publisher -- Alberta Career Development and Employment, City Centre Building, 10155 - 102 Street, Edmonton, Alberta T5J 4L5

2. **Canadian Classification and Dictionary of Occupations** 1989 - 9th edition
   Publisher -- Employment and Immigration Canada (This particular series is being phased out in favor of the National Occupations Classification guide.)

3. **Job Futures: Occupational Outlook**
   Publisher -- Employment and Immigration Canada (1990)

4. **Opportunities in Agriculture Careers by William C. White**
   Publisher -- VGM Career Horizons (Lincolnwood, Illinois, 1988)

5. **Career Trends**
   Publisher -- Calgary Board of Education

NOTE
These resources and others should be accessible through your local Career Development Centre.

6. **The Business of Agriculture**
   (A Resource Book for Teachers of Career and Life Management 20)
   Available from Ag in the Classroom at 427-2402
   or Room 200, 7000 - 113 Street, Edmonton, Alberta T6H 5T6.

7. **Alberta Agriculture Personnel Services Division**
   J.G. O'Donoghue Building
   Main Floor, 7000 - 113 Street
   Edmonton, Alberta T6H 5T6
   Phone: 427-2111

STUDENT RESOURCE

SHEET ONE --

FROM FARM TO CONSUMER:
The Path of Butter

Activity 22

INTEGRATING AGRICULTURE INTO THE PHYSICS PROGRAM

STUDY QUESTION:

How can physics concepts be used to solve agriculture-related problems?

THE ACTIVITY:

Students solve problems within the Physics 10 and 20 curriculum using agricultural examples.

CURRICULUM FIT:

DIVISION FOUR - PHYSICS 10

- Motion and related principles as outlined in concepts 10.3 to 10.6 of Alberta Education curriculum guide (1977).

DIVISION FOUR - PHYSICS 20

- Momentum and the interaction of bodies in nature, energy, simple machines, physics and personal safety as outlined in concepts 20.1 to 20.2 and 20.6 to 20.7 of curriculum.

AGRICULTURE CONCEPTS:

Problem solving, design.

PURPOSE:

To help students become aware of the diversity of the agriculture industry while appreciating practical applications of physics concepts.

To help students become aware of opportunities for careers within agriculture.

To help the student develop an appreciation for the complexity of the mechanics in the agriculture industry.

MATERIALS REQUIRED:

Physics curriculum and texts, agriculture-related literature (optional).

TIME REQUIRED:

Varies according to the number of problems you choose to modify and use.

NOTE
Other concepts may also be used to integrate agriculture, but those listed lend themselves particularly well to the topic.

BACKGROUND - For the Teacher

Physics is regarded as the basic science underlying man's understanding of nature. The concepts of physics are applicable to almost all of our daily activities, including those involved in agriculture. Since Alberta's agriculture industry is of such a diverse and important nature, it is imperative that students develop an appreciation for it. By solving physics problems with an agriculture component, students will be better able to appreciate the scope of the industry and the possibilities it offers to them as individuals.

Physics is open to many teaching approaches, and one that highlights agriculture may even serve to add more interest to the subject. Some agricultural knowledge is necessary to help you modify physics problems, but you do not have to be an expert on agriculture. Lessons can be approached using very simple agriculture concepts or they can be more detailed depending on what you are comfortable with. You may wish to consult the resource area in your school for ideas on agriculture or you can obtain material from a variety of agricultural organizations, but this latter step should not be necessary.

PROCEDURE

Part 1 Activity	1.	Consult the sample problems in the attached teacher resource.
Conclusion	2.	Review the physics problems your students will be studying. Modify them to include agricultural themes, or create completely new problems of your own.

EVALUATION STRATEGIES

1. Ability of students to follow rational, organized problem solving strategies (i.e., extracting pertinent information, using proper formulas and arriving at the correct answer).

RELATED ACTIVITIES

1. Depending on the problems chosen or created, you may be able to duplicate or view an actual example of the situation described.

   Provide the students with a problem and ask them to design a machine that will help resolve it. (e.g., how to break up the hard pan layer of soil in a field without mixing up the overlying soil layers)

Original lesson idea and material by Mike Weisgerber
Modifications by AITC

Sample problems and activity outlines are included as a starting point for integration of agriculture into the Physics 10 and 20 program. Concept numbers are included to provide direct mapping to the Alberta Physics 10, 20 and 30 curriculum guide (1977).

SHEET ONE -- TEACHER RESOURCE

Problem 1 (10.3.2)

Irrigation farmers are required to order their water through their irrigation district office. When they place the order, the controller can phone the automated computer controlled gate at the appropriate reservoir and open the gate to allow more water to flow into the canal.

If a farmer whose land is 40 km from the reservoir orders his water, and the water in the canal flows at 30 km per hour:

a) How long will it take for the water to reach his land?
b) Plot the corresponding graph (distance vs time)
c) What is the significance of the slope of the line?

Solution:

a) $v = 3$ km/hr, $d = 40$ km

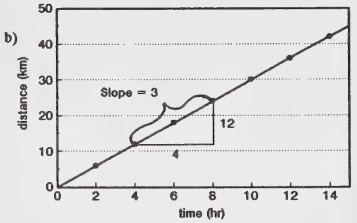
$v = \frac{d}{t}$

$t = \frac{d}{v}$

$= \frac{40 \text{ km}}{3 \text{ km/hr}}$

$= 13$ hours

b)



c) The slope is the velocity = 3 km/hr

time	2	4	6	8	10	12	14
distance	6	12	18	24	30	36	48

Extension:

What is the flow of the canal in m^3/sec if it is 50 m wide and 30 m deep?

$$v = 3 \frac{\text{km}}{\text{hr}} \times 1000 \frac{\text{m}}{\text{km}} \times \frac{1 \text{ hr}}{3600 \text{ s}} = 0.833 \text{ m/s}$$

$$\text{flow} = 0.833 \text{ m/s} \times 5.0 \text{ m} \times 3.0 \text{ m} = 12.5 \text{ m}^3\text{/s}$$

Follow-up Activity:

Visit a nearby canal, and using a fishing line and float, calculate the velocity of a river by plotting distance vs time. Calculate the flow of the canal by measuring depth and width.

SHEET TWO -- TEACHER RESOURCE

Problem 2 (10.4.10)

A bale is dropped from the top of a 3.0 m high bale stack. What is the bale's final velocity, just before it hits the ground?

Solution:

$a = 9.8 \text{ m/s}^2$ $\quad d = v_i t + 1/2 at^2$ $\quad d = \frac{(v_i + V_f)}{2} t$

$d = 3.0$ m $\quad 3.0 \text{ m} = 1/2 (9.8 \text{ m/s}^2) t^2$

$v_i = 0$ m/s $\quad t = .61 s^2$ $\quad 3.0 \text{ m} = (Vf/2) (0.78 s)$

$t = 0.78 s$ $\quad Vi = 7.7$ m/s

Problem 3 (20.2.4)

A farmer uses a 4.0 kg hammer to drive a fence post into the ground. The velocity of the hammer is 3.0 m/s just prior to the hammer contacting the post.

a) Calculate the kinetic energy of the hammer.
b) What would be the effect of doubling the velocity?
c) What would be the effect of doubling the mass of the hammer?

Solution:

a) $m = 4.0$ kg
$v = 3.0$ m/s
$KE = 1/2 mv^2$
$= 1/2 (4.0 \text{ kg}) (2.0 \text{ m/s})^2$
$KE = 18J$

b) $m = 4.0$ kg
$v = 6.0$ m/s
$KE = 1/2 mv^2$
$= 1/2 (4.0) (6.0)^2$
$KE = 72J$

- doubling velocity results in 4x as much kinetic energy

c) $v = 3.0$ m/s
$KE = 1/2 mv^2$
$= 1/2 (8.0) (3.0)^2$
$KE = 36J$

- doubling hammer mass results in a doubling of KE.

Follow-up Activity:

Using a hammer head, drop it on small posts from various heights. Measure the distance the posts move into the ground with the various gravitational potential energies. Graph the results of the effect of gravitational potential energy on the distance the posts are moved.

TEACHER RESOURCE

SHEET THREE -- ACTIVITY 1 (20.6.2 & 20.6.3)

Students will visit a machinery dealer and observe a combine (optionally a toy combine may be used in the classroom). The student is required to find as many simple machines as possible, within the complex combine, and describe one simple machine to the class by:

a) Naming and identifying the simple machine
b) Describing the function(s)

i.e., - multiply the applied force
- change the direction of the applied force
- multiply the distance that an applied force moves.

Extension:

The student will take on the role of an agriculture engineer by redesigning one part of the combine to make it more useful in some respect. The students must draw the new design and defend their modification.

Activity 23

WATER, WATER EVERYWHERE

STUDY QUESTION: What are the water needs of a region? How does the agricultural industry manage its use of the water resource?

THE ACTIVITY: Students investigate irrigation in Alberta.

CURRICULUM FIT:

GRADE SEVEN - AGRICULTURE

- Agricultural water use and management.

AGRICULTURE CONCEPTS: Water management and technology.

PURPOSE: To help students develop an appreciation of the critical need for water for specific crops.

To introduce students to a specialized technology which extends the use of the land base.

To help students discover possible career opportunities.

MATERIALS REQUIRED: Map of Alberta's irrigation districts, audio-visual material (see resource list at end of lesson), "Overview of Irrigation in Alberta" (attached).

TIME REQUIRED: Two to three class periods.

BACKGROUND - For the Teacher

The results of irrigation are almost magical. Use the excitement and interest generated by these observations to fuel student investigation into this specific technology and its impact on the land base. This activity can be delivered as a student individual study project -- the procedure provides various possible lines of inquiry.

PROCEDURE

Part 1
Introduction

1. Introduce irrigation with discussion. What is irrigation? Why is it used? Where is it used? What types of irrigation are there? What types are the most common in Alberta? What are the needs of the farmer?
2. You could show a film/video/slide presentation at this point.
3. Have a debate to discuss such issues as the impact of the Old Man River Dam project on the environment and on agriculture. Give the students some lead time to do group or individual research on the subject. You may wish to divide students into pro/con factions.

Part 2
Activity

4. Students can do a research paper on one or several aspects of irrigation. Use the sample topics below or make your own.
   a) What technology (equipment) is required for irrigation and how is it used?
   b) Under what conditions is irrigation necessary? Are all soil types and land formations suitable for irrigation? What water sources are used for irrigation. (Try to find and outline them on a map.)
   c) How do irrigation farmers deal with potential problems like erosion, salinization, water availability, weed growth in canals, high capital and operating costs, etc.?
   d) What proportion of crops grown in Southern Alberta are grown under irrigation? What is the value of these crops? What types of crops are they? How have these figures changed over the years? (Graph the values.)
   e) What businesses offer specialized services to irrigation operations? How important are these businesses to local economies? How many people do they employ? How much business do they generate? What types of jobs are related to the irrigation business?

Part 3
Conclusion

5. Students can give oral presentations of their reports, and the class can ask questions.

DISCUSSION QUESTIONS

1. Is irrigation worth it to the farmer/to society? How do you justify the high cost of installation and government assistance programs? Are there alternatives to irrigation?
2. Pretend that a new policy for water management in Alberta is being planned. Identify the various groups who make demands on water and discuss how water use allotment could be best decided. What are your priorities for water use in Alberta?
3. What would interruption of water mean to an irrigation farmer in financial and personal terms? What would it mean to the farm family's future.

EVALUATION STRATEGIES

1. Participation; quality and presentation of reports.

RELATED ACTIVITIES

1. Students could design, develop and test a model of an irrigation system.
2. Invite a guest speaker to talk about irrigation (students can prepare questions and interview the guest).
3. If you live near an irrigation district, arrange a tour.

RESOURCES

Water, Sun, and the Hand of Man -- audio-visual presentation produced by the Alberta Irrigation Projects Association. Write to Box 278, Lethbridge, Alberta T1J 3Y7 or call 328-3063 for more information.

Old Man River Dam -- Alberta Public Works Supply and Services

Water Literacy Kit

Audio visual materials from Alberta Agriculture Film Library, 7000 - 113 Street, Edmonton, Alberta T6H 5T6

Recommended are:

On the Waterfront (Order #560 VT)
The Magic of Water (553)
The Right Amount (554 F/VT)
Water, Water: Making the Most of Moisture (556 F/VT)

Written materials from the Alberta Agriculture Print Media Branch at the same address as above.

Original lesson idea by Frank Verbisky
Modifications by AITC

TEACHER RESOURCE

SHEET ONE --
Overview of Irrigation in Alberta

Irrigation is necessary to grow crops in some areas of Southern Alberta where the climate is arid or semi-arid, and where rainfall is low and unpredictable. More than 466,000 hectares of land is irrigated in Alberta, which is about 65 per cent of the Canadian total. Irrigated areas in this province take up about 4 per cent of the arable land, but provide over 20 per cent of Alberta's agricultural production. Many of these crops, like vegetables, are not grown on dryland farms. Obviously, irrigation is an important industry.

However, irrigation is a fairly recent phenomenon in Canada. The first irrigation scheme in Alberta began in 1897 on Fish Creek, south of Calgary. Mormons played an integral role in the early development of irrigation in the province, as they created the basis for the southern systems through hard work and expertise gained in Utah.

Before the 1890s, only individuals were involved in irrigation, but from 1898 to 1915, major investment companies and corporations like the Canadian Pacific Railway became involved. Irrigation development was seen as the best means of paying for the railways and colonizing the land.

The second phase of development began in 1915 when the provincial government became involved by enacting the Irrigation Districts Act. The legislation permitted farmers in a district to organize for the purpose of floating a bond issue to raise funds to construct an irrigation project. This allowed for the rapid expansion of irrigated land.

In 1935, the federal government, through the Prairie Farm Rehabilitation Administration (PFRA), provided engineering and financial assistance on water development projects on the prairies. During the 1950 to 1960 period, the PFRA and the provincial government cooperated to construct major irrigation projects, including the development of the St. Mary River Irrigation District, which is Canada's largest at some 133,000 hectares.

By the early 1960s, irrigation works began to show their age and were in an extreme state of deterioration. Seepage from improperly-built canals caused many hectares of land to become unproductive either because of waterlogging or salinization. (Salts are inherently present in all soils in the irrigated areas. Excess salts restrict plant growth, but salinization should not occur if irrigation practices are such that the water table does not remain too close to the surface and there is net downward flow of water through the soil profile.)

In 1970, the Alberta government and 13 irrigation districts launched a major cost-shared rehabilitation program. By 1986, the province had invested $525 million, while the districts had expended $97 million, including their share for operation and maintenance. The cost sharing is done on the 86:14 formula, which is based on the premise that this is the ratio between societal benefits and direct benefits to irrigation farmers.

TEACHER RESOURCE

SHEET ONE (cont'd)--

In Alberta, there are some 5,800 irrigation farms in a region that would support perhaps fewer than 1,000 dryland operations. Crops grown under irrigation bring Alberta approximately $850 million in gross revenue a year, while irrigation development and related services employ some 35,000 people.

The major crop is soft white wheat, which is grown on nearly 40 per cent of irrigated land, and is used for cake flour and pastas. There are also many other important crops ranging from alfalfa to oilseeds to sugar beets to vegetables. Hay, barley and other crops are grown as food for livestock. Indeed, irrigation is partly responsible for the fact that Southern Alberta accounts for over 50 per cent of the province's livestock industry.

Farmers in Alberta employ three methods of irrigation. With the **surface method,** water is applied to the soil at ground level, and flows by gravity over the surface of the field. **Trickle** or **drip** irrigation uses a system of plastic pipes to drip water over the soil surface. With the **sprinkler method**, the water is sprayed into the air and falls to the ground like rain.

Irrigation in Southern Alberta has created one of the most productive and diversified agricultural regions in Canada. But irrigation benefits more than just agriculture. Fifty towns and villages, with a combined population of more than 75,000, rely on irrigation water supplies. Reservoirs also allow for fishing and other recreational activities. It is estimated that up to three million hectares of land in the southern prairies can be irrigated, but expansion is curtailed by availability of water resources and by high capital costs.

Sources Consulted:

Irrigation in Alberta (Alberta Agriculture Agdex 560-1)

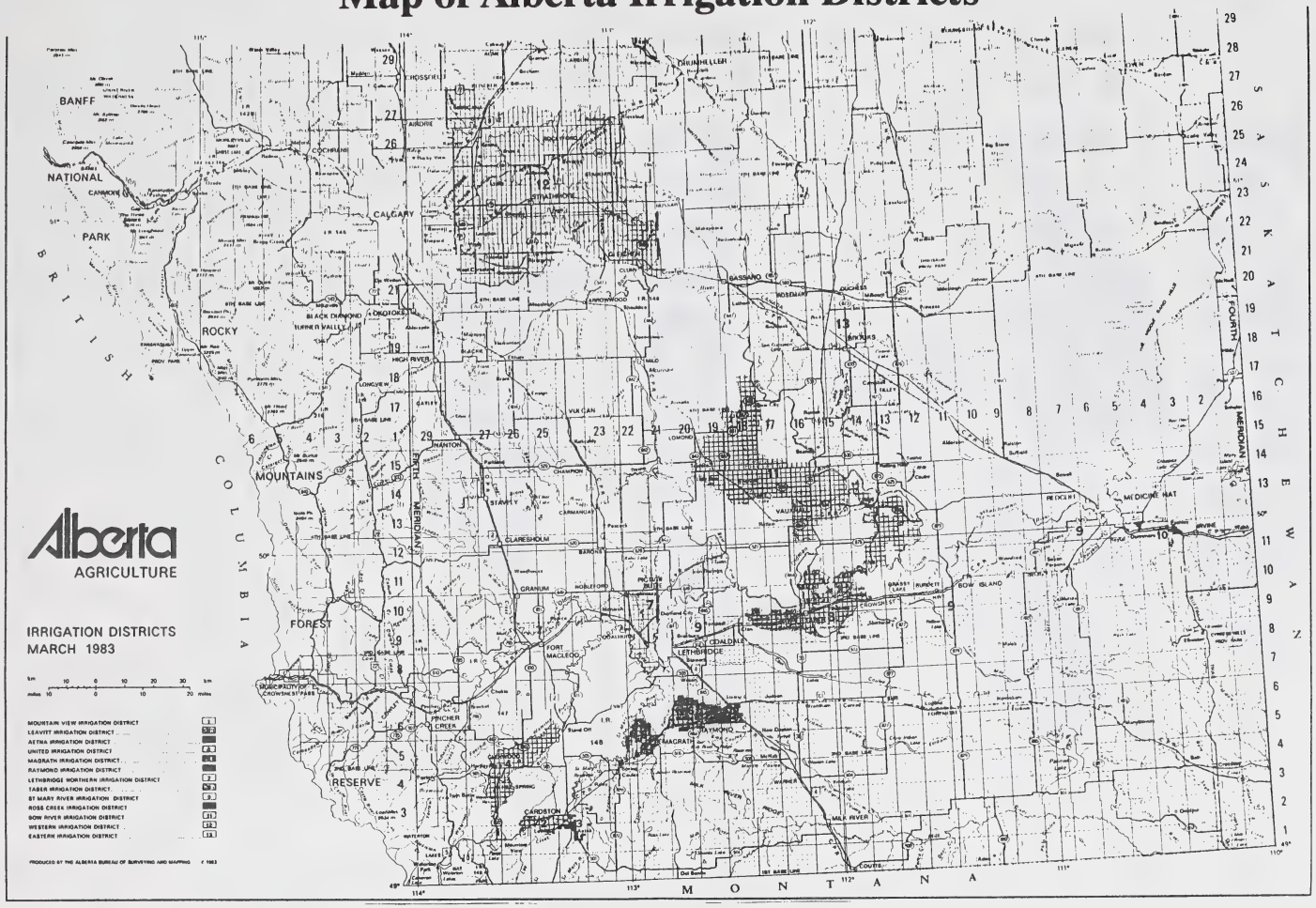
Water, Sun, and the Hand of Man (Alberta Irrigation Projects Association script prepared for audio-visual presentation)

The Canadian Encyclopedia (Hurtig Publishers Ltd., Edmonton, 1988)

STUDENT RESOURCE

SHEET ONE --

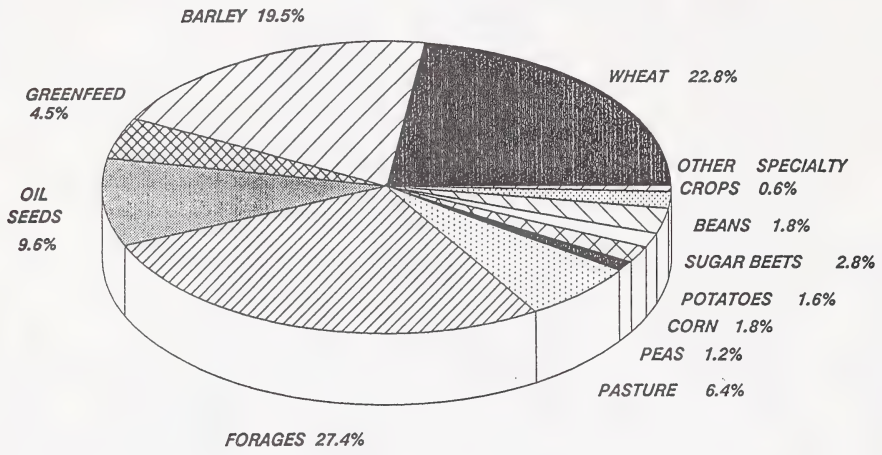
Map of Alberta Irrigation Districts



STUDENT RESOURCE

SHEET TWO --

Irrigated Crops - 1988
Alberta Irrigation Districts



Courtesy of Alberta Agriculture Irrigation Branch

STUDENT RESOURCE

SHEET THREE --

Irrigation Districts - Incorporation & Assessed Acreages

IRRIGATION DISTRICT	DATE INCORPORATED (IRRIG. ACT)	APROX. NO. OF FARMERS	ASSESSED ACREAGE 1974	ASSESSED ACREAGE 1986
1. MOUNTAIN VIEW	1921	30	3 717	3 710
2. LEAVITT	1936	75	4 421	4 460
3. AETNA	1935	25	3 081	3 444
4. UNITED	1921	175	34 034	34 336
5. MAGRATH	1925	110	9 077	14 579
6. RAYMOND	1926	309	23 257	44 950
7. LETHBRIDGE NORTHERN	1923	750	105 958	120 416
8. TABER	1921	450	63 823	73 314
9. ST. MARY RIVER	1946	1 758	237 244	331 493
10. ROSS CREEK	1949	8	2 068	1 319
11. BOW RIVER	1920	750	118 741	189 202
12. WESTERN	1944	600	44 219	86 014
13. EASTERN	1935	1 220	207 245	247 804
TOTAL		6 260	856 885	1 155 041

* *Courtesy of Alberta Agriculture Irrigation Branch*

Teacher Strategies & Education Units

I

Agriculture in the Math Curriculum

AGRICULTURE IN THE MATH CURRICULUM

Application:

Integrate agricultural concepts and practices into the problem solving portion of the Junior High Mathematics curriculum for all three grade levels.

Rationale:

The aim of education is to develop skills and attitudes of individuals, so that they will be capable of making informed choices and acting in ways that benefit their own lives and the life of their community. The application of agricultural concepts to problem solving supports this philosophy. By doing agriculture-related problems, students will learn more about the importance of the industry to their daily lives. They will be exposed to the diversity of the industry in Alberta and to possible career opportunities. The use of agricultural topics may also stimulate student interest in different problem solving strategies and eliminate boredom.

Examples for consideration:

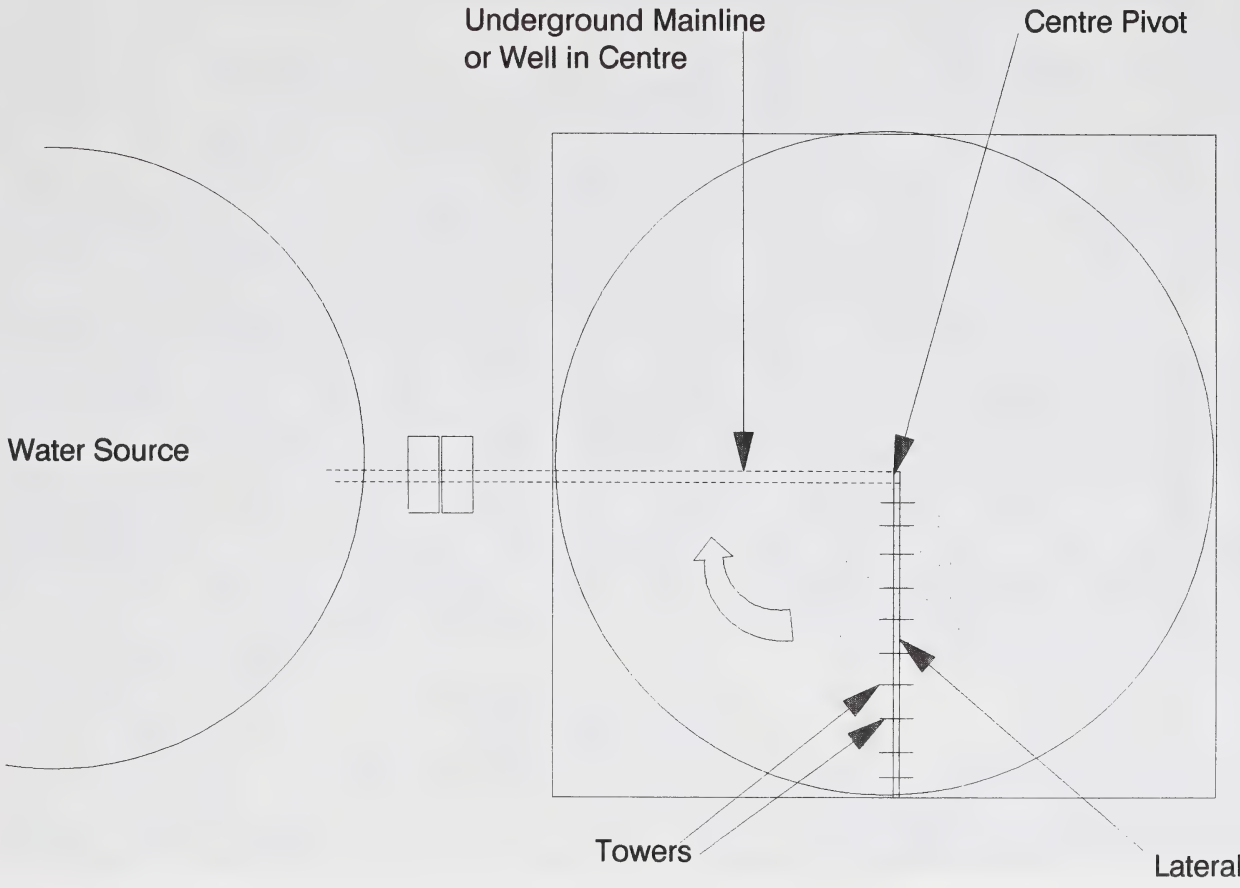
1. Introduce perimeter and area by discussing harvesting techniques and irrigation practices used by farmers (i.e., the first swath by a combine around the edge of a grain field).
2. Circumference may be introduced by discussing pivot irrigation systems. For instance, if a pivot system was a certain length and it rotated in a perfect circle, spraying water a certain distance, what would be the circumference of the watered land (diagram follows this question).
3. Volume can be taught by formulating questions to determine:
   a) the amount of water pumped onto a crop over a period of time by an irrigation system that delivers a given amount of water per hour.
   b) how much grain would fit into grain bins or hoppers of a certain size and number.
   c) the quantity of fertilizer needed to cover a field.
4. Multiplication practice -- use weed infestation as an example.
5. Graphing can be done using a variety of agricultural statistics (i.e., crop production volumes and values; percentage of jobs in Alberta which are linked to agriculture, indirectly and directly; transportation data; capital investment in the industry; changes in rural urban populations).

Remember, these types of questions can be formulated without extensive knowledge of agriculture. All it takes is a little imagination. Problem solving questions lend themselves to this kind of adaptation. Thus, teachers can use a different and fresh perspective, while still covering all the curriculum concepts. Teachers can get ideas by consulting the agricultural materials in their resource rooms, or they can obtain information from a variety of agribusiness or from Alberta Agriculture.

Original material by D.M. Gogal
Modifications by AITC

SHEET ONE --

Field Layout for Self-Propelled, Centre-Pivot System



Teacher Strategies & Education Units

II

Debating Procedure, Simplified

DEBATING PROCEDURE, SIMPLIFIED

1. A debate centres around a very specific statement called a "proposition". Propositions are worded in such a way as to suggest a change.

   e.g. Resolved, that the driving age for Albertans be raised to 17.

   Resolved, that as of 2001, all vehicles licensed to operate in Alberta must comply with the emission standards set out in Environmental Policy #3Z825.

   Resolved, that as of June 1, 2001, the storm sewer system of Osirthh, Alberta be modified so that no raw sewage enters the Osirthh river.

2. There are usually several issues which must be examined before the decision is made about the proposition. Issues need to be supported with arguments and evidence.

3. "Arguments" are orderly presentations for and against the proposition. It is possible for arguments to stand by themselves, but they are much more convincing if backed up with solid evidence and examples.

4. "Evidence" is offered in debate to strengthen one's argument. People use facts, statistics from reliable sources and expert opinion as evidence. Most of the hard work in debating is digging up the evidence after having determined the argument one is going to present.

   It will also be important for both teams to anticipate the arguments of the other and to prepare to refute those arguments.

5. It may be necessary to have a moderator who can maintain order and ensure that both sides stick to the issue.

The Order in Debating

1. The proposition or resolution is stated. The people taking pro/con are identified.

2. The affirmative (pro) team present their argument.

3. The negative team (con) present their argument.

4. Teams take turns presenting their evidence and rebutting the arguments of the other team for as many rounds as previously agreed to.

* For more guidance and detail regarding debating, contact a local member of the Alberta Debate and Speech Association, or refer to **Debate** a manual produced by that organization.

Teacher Strategies & Education Units

III

Outline for a Resource Unit

Production of Food From Seeds

Outline for a Resource Unit
PRODUCTION OF FOOD FROM SEEDS

1. Introduction and Rationale

This unit is designed for Grade 4 students. It is projected that the unit will be four to five weeks in duration. This project will be an integrated unit incorporating curriculum objectives from Science, Social Studies, and Health. Related activities in Language Arts, Math and Art will be suggested. There are several reasons for this multi-disciplinary approach. Firstly, students will be assisted to integrate learning across curriculum areas. This approach is consistent with current research and pedagogical emphasis on holistic learning. It is anticipated that student motivation and involvement will increase since larger time blocks and range of activities allow for individual differences and interests. Secondly, the integrated approach more closely reflects the context of the unit, agriculture. This industry is holistic in nature in that a wide range of factors are involved: environmental, technical, and social. A sense of the holism can best be conveyed through an integrated approach.

2. Anticipated Outcomes

The knowledge, skills, attitudes and values to be developed are outlined below. Although achievement of objectives will be through integrated activities and within a single context, curriculum areas are listed separately for ease of reference.

2.1 Specific Objectives (Process Skills)

Science Topic B: Living Things and Environment: Environmental Factors

Students should:

2.1.Sc.1 classify on the basis of observable characteristics, record and communicate classification system.

2.1.Sc.2 design and construct systems to determine how organisms respond to changes to their environment.

2.1.Sc.3 control variables such as temperature, light and moisture and describe the response of the organism to these factors.

2.1.Sc.4 infer the types of natural habitats of organisms on the basis of response to tested variables.

Social Studies Topic A. Part 4: How Do Albertans Use Their Natural Resources?

Students should:

2.1.SS.1 locate information using library skills to choose appropriate material.

2.1.SS.2 gather, organize and interpret information through use of pictures, charts, graphs and/or reports.

2.1.SS.3 participate in individual, small group and class activities.

2.1.SS.4 make meaningful contributions to discussions, supporting ideas with facts and reasons.

Health Theme IV B: Body Knowledge and Care: Nutrition

Students should:

2.1.He.1 identify nutritious foods.
2.1.He.2 classify foods into four food groups.
2.1.He.3 identify functions of a variety of foods.
2.1.He.4 identify food requirements.
2.1.He.5 plan a balanced breakfast and nutritious snacks.
2.1.He.6 select nutritious foods.

2.2 Generalizations

Science

Students should:

2.2.Sc.1 recognize that organisms live in habitats that have environmental factors favorable to their survival.
2.2.Sc.2 acquire a sensitivity for the nature of systems.
2.2.Sc.3 recognize the importance of considering the interdependence of environmental factors.
2.2.Sc.4 recognize that organisms respond to changes in environmental factors within their habitat.

Social Studies

Students should:

2.2.SS.1 recognize that our way of life and our environment are affected by the presence and use of natural resources.
2.2.SS.2 develop an appreciation for the impact of people on the environment.
2.2.SS.3 develop a concern for needs of future Albertans.
2.2.SS.4 recognize that people modify and change the environment according to their needs.
2.2.SS.5 recognize that changes in technology can affect our use of natural resources.

Health

Students should:

2.2.He.1 appreciate quality and nutritional value of food.
2.2.He.2 develop an awareness of issues related to food safety.

3. Analyses of the Unit

Activities to be incorporated in the unit are intended to be starting points for individual or group projects which capitalize on student interest and motivation. Some suggestions are included; more can be added as the unit is developed.

Activities in this document are grouped by subject areas. It is not intended that the sequence of lessons progress from subject area to subject area. Rather, the intention is that the activities be interwoven and modified to best suit the needs/interests of the students and the time requirements of the activities. For example, the science activity involving plant growth will require several weeks for completion. During the growth period activities from other subject area components would be initiated.

The Social Studies component should be articulated with other components of Topic A: Alberta: Its Geography and People. Specifically this unit should follow Part 3: Renewable and Non-Renewable Resources. This will ensure that students understand the concept of resources and the landform regions of Alberta.

4. Activities

A. Science Component Activities

1. Classification

- Students work in small groups (two or three) to sort collection of seeds. Group must agree and be able to explain classification system.
- Share in large groups the classification used.
- Identify seeds by comparing with display, with labelled samples, or with pictures and brochures.

Materials

- Container with mixture of seeds for each group. Include grain, vegetable, flower and weed seeds.
- Labelled samples, pictures and brochures (to be introduced at appropriate time during lesson - not available at beginning).
- Research material to support individual initiative research (optional).

Evaluation

- Participation in group.
- Consistency in applying chosen classification system.
- Clarity in explaining system to large group.

Related Activities

- Prepare individual or group display of seeds.
- Use seeds to create texture in art project.
- Research types of plants and uses of plants produced by seeds.
- Compare weights of a given volume of different types of seeds. Represent findings in graphic form.

2. Experiment

- Design and construct experiments controlling variables related to plant growth: heat, light, temperature.
- Record observations.
- Describe response of plants to specific growing conditions.
- Discuss seed growth as it relates to agriculture.

Materials

- Seeds, soil samples, containers.

Evaluation

- Clarity of research questions.
- Precision and follow-through in conducting research.
- Accuracy in recordkeeping.
- Clarity in description of results.

Related Activities

- Research seed and plant structures and their functions.
- Research foods derived from specific seeds.
- Research growth cycles of specific seeds.
- Research water and light requirements for optional growth of given plants.
- View video to become aware of role of science and research in agriculture.
- Contact regional research facility.

B. Social Studies Component

1. How Do Albertans Use Natural Resources to Produce Food from Seeds?

- Locate and interpret information related to soil types, rainfall, temperature and crop production for a region of Alberta.
- Organize information on retrieval chart.
- Present findings in written, map or other form.

Material
- Junior Atlas of Alberta
- From the Group Up
- A Province at Work
- How Sweet It is - Sugar
  Available from Alberta Agriculture
  Film Library, 7000 - 113 Street
  Edmonton, Alberta T6H 5T6.
- Brochures, pamphlets, library resources
  Alberta Fresh Vegetable Marketing Board Teaching Unit
  Write to: 220E - 12 Street A North,
  Lethbridge, Alberta T1H 2J1 Ph: 327-0447

Evaluation
- Participation in large and small groups.
- Written or visual synthesis.

Related Activities
- Tour farm in local area, e.g., vegetable farm, grain farm.
- View "Inside Story" - film - Alberta Wheat Pool.
- Visit local processors (e.g., Northern Alberta Potato Growers, four mill).
- Guest speaker - Classroom Agriculture Program
- Collect and display labels of Alberta grown produce.
- Compare measures used for yield of a variety of crops.
- Prepare display of agricultural by-products.
- Tour Alberta Agriculture Crop Protection Branch display,
  Contact person Jerome Lickacz: 427-2530.
- Investigate seeding and harvesting techniques and equipment.

2. Should People Make Major Changes to Their Environment to Meet Their Needs?
- View film to observe importance of water to human existence.
- Discuss competing values in water use.
- Develop research questions related to water use, environment modification and agriculture (e.g., What changes must be made to provide irrigation water to farms? What equipment is used to irrigate for growing crops? What crops are produced on irrigated land?).
- Identify, locate and interpret appropriate resource material in groups or individually.
- Organize information on retrieval chart.
- Select a format and prepare report of findings.
- Identify advantages and disadvantages of using water for irrigation.

Materials
- Water - film - CAMS film number 403 "Human Impact on Landscapes of Alberta", Alberta Geography Series.
- "Watering the Land" from The Group Up, pp. 91-96.

Evaluation
- Participation in group project.
- Effective use of resource material.
- Organization of data.
- Presentation of data.

NOTE
Care should be taken that the values of other groups be considered. It will be necessary to identify resources for this purpose.

Related Activities
- Compare irrigation systems; flood, wheel move, pivot.
- Investigate energy consumption in irrigation.
- Participate in water appreciation activities; see Water Literacy Unit - Alberta Environment.

C. Health Component

1. Relate crops produced in Alberta to food groups
   - Brainstorm foods within the food groups which are produced in Alberta.
   - Collect date related to nutritional value of foods.
   - Display/present information.

   Materials
   - Explore Nutritious Alberta - teaching unit,
     Contact persons: Tracy McCloskey - Edmonton Public School Board
     Aileen Whitmore - D.H.E. Edmonton: 427-2412.
   - Up with Nutrition - game - A.T.A.

   Evaluation
   - Participation in group.
   - Knowledge of food groups and Alberta products.
   - See also evaluation strategies in teaching unit.

   Related Activities
   - Visit retail outlets to identify Alberta products.
   - Plan an Alberta meal of Alberta products.
   - Prepare posters advertising Alberta foods available in school lunchroom.
   - Visit bakery or other food production operation.
   - Compare technology change in food production, e.g., use stones to grind wheat into flour.
   - Make dough and bake bread working in small groups.

5. Evaluation

Evaluation of outcomes of the unit will be done through checklists, anecdotal records and teacher-made tests. It will be important to establish evaluation procedures at the beginning of the unit with the students.

NOTE
The specific evaluation tools will incorporate those presented with each segment of the unit. These will be developed and submitted with the final draft of this unit.

6. Additional considerations and comments

Several parts of this project remain to be addressed. For example, a more complete listing of resources, a bibliography and annotated resource list must be prepared. The activities within each component need further refinement. In particular, the Social Studies activities must be organized into lessons of manageable length. Many of the activities listed in "Related Activities" should be further developed and incorporated as developmental activities. Culmination activities, which will reflect the effort and involvement of students, should be considered.

Original material by Ardyth Garrison
Modifications by AITC

Teacher Strategies & Education Units

IV

Holding an Agriculture Fair
(as an Alternative to a Science Fair)

HOLDING AN AGRICULTURE FAIR (as an alternative to a Science Fair)

Time Line -- Donna's Tips After Two Years of Experience

5 - 7 months in advance

1. Discuss idea with individual staff members.

2. Set a tentative date - Ag Week in March or perhaps for Parent-Teacher Interview time?

3. Discuss objectives, theme and outline at staff meeting.
   a. Decide on project area that will be judged.
   b. Decide on areas that will not be judged.
   c. Decide on categories and rules.
   d. Find ways that these projects can become part of the regular routine and not extra work.

   You should prepare a proposal of all this before the meeting and then ask for additions or deletions (saves time).

4. Suggest that whatever projects that can be completed ahead of time are done and stored.
   e.g., artwork
   band, choir music (practice regularly so that everything doesn't coincide)
   arts and crafts projects
   computer graphics (banners, certificates)
   social studies reports (in writing or poster form)
   industrial arts
   sewing
   poetry and stories
   drama club (could select an appropriate play and start early)

5. List judges and volunteers. Orient them as to their duties and the standards by which the program will be evaluated. Communicate in writing if at all possible. Notify of times, dates and location.

6. Scrounge magazines, order films, pamphlets, etc.

7. Notify district agriculturist and home economist or other available resource people. Do you have a specific role or duty you would like them to play? Clarify; don't assume!

8. A supportive librarian is essential. Inform as to the objectives and scope of the event.

9. Contact possible donors by letter or phone if this is required.

2 months in advance

1. Science and social display projects should be started (depending on the project)
   - gather information
   - construct models; do experiments
   - organize data, write reports, make posters

2. Gather donations, pledges.

1 month in advance

1. Confirm details with judges and volunteers.

2. Inspect all entries for names, class number.

3. Arrange times for teachers and students to put up displays (if using the gym, it will be unavailable for a day and a half).

4. Book tables from local clubs.

5. Order ribbons and prizes.

6. Arrange viewing schedule and publicity
   e.g., students 2:30 - 3:30
   public 3:30 - 7:30

7. Plan the clean up. Involve students in the morning. (It took 180 students in grades 6, 7 and 8 less than a half-hour to clean up a gym and load up the tables.)

8. Make sure the local paper and radio/TV station know about this event well in advance. Prepare a press release for them and offer to line up a couple of students to interview on the day.

NOTES
Do any judging possible before the final day (e.g., writing).
Judge displays in the morning (3 to 4 hours minimum).
Prizes are up to the individual school -- you could raise money or ask for donations from families or businesses.

Delegate and save your sanity!!

Ensure that the person has a clear picture of what you are asking to be done and the purpose of the task. Clarify any standards and time lines. If another task is dependent upon this one, make that clear too!! What supplies, if any, will he/she have available?

Once you have delegated a task, let the person do it.

e.g., The band teacher arranges a musical program for the evening.
Drama students organize a play to be shown every half hour in another room.
Art club designs, produces and displays posters advertising the event
(also takes them down afterwards!).
Volunteer teacher looks after getting tables and the volunteers required.
Volunteer language arts teacher gathers the writing, arranges it and presents it to the judges.
Volunteer students greet judges or guests and direct them to the event.

Coordinator Duties

1. Plan outline, time lines.
2. Suggest theme, topics in each area.
3. Delegate jobs - follow up on progress.
4. Plan display areas, identify the number of tables required.
5. Arrange for publicity, posters (could be delegated).
6. Organize resource people and materials.
7. Contact volunteers, judges, obtain donations.
8. Provide judging supplies and equipment.
9. Send out thank you notes (certificates made by computer class?).
10. Keep some notes so it will be easier next time (e.g., number of tables, judges, time lines used and how they worked, names of donors and volunteers).

Additional Fair Flairs

1. Invite a few agriculture businesses and groups
   e.g., 4-H
   Cap
   Agaware
   Alberta Wheat Pool
   Local businesses, e.g., outside machinery display
   Milk producers, pork producers, other associations
   (Many of these groups have interesting displays and will give away buttons, balloons, pamphlets and samples which add a festive air to the event. They might even donate a door prize. However, stipulate no sales, just information.)
2. Invite seniors and other schools before the fair is open to the public.
3. Plan pre-fair activities.
   a. rodeo days (gym activities)
   b. lip sync old, humorous country songs
   c. teach "old time" dancing
   d. produce a food product commercial (We used M-Moo cow)
   e. guest speakers (in the ag. business) or pioneers

Volunteers

1. A teacher on maternity leave or retired may be able to organize and read through and pre-judge stories or art work.

2. Regional agriculture people may be willing to judge and supply information.

3. Many parents are extremely helpful.
   e.g., Willing to organize a petting zoo
   Demonstrate crafts, e.g., baking bread, spinning
   Gathering donations
   Publicity
   Collating ribbons, judging instructions and forms

4. Business people with interest in areas.
   e.g., Agronomists
   Local artists
   Newspaper personnel

> **NOTE**
> It is not necessary to have prizes or judging but it is a motivator if the students are going to spend time making displays.

Suggestions for Projects

Art - theme related, e.g., harvest, salute to pioneers

Writing - select themes and topics for various grades

Social Studies - select topic from curriculum
- **Grade 4** - roles of natural resources in agriculture
- **Grade 5** - roles of agriculture in Canada
- **Grade 6** - other cultures' agricultural methods - compare/contrast
- **Grade 7/8** - global roles - trade, government

Science
- **Grade 4/5/6** - mechanical (irrigation, dairy farming, tractor types)
- **Grade 7/8** - plants, animals
  - erosion, shelterbelts
  - animal diseases
  - fertilizers
  - chemical sprays
  - soil types
  - climate

In essence, when it comes to science, you should focus on the study of plants, animals and the environment using an agricultural perspective.

The Day After

Relax
Don't think too hard about next years' fair
Give yourself a pat on the back

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